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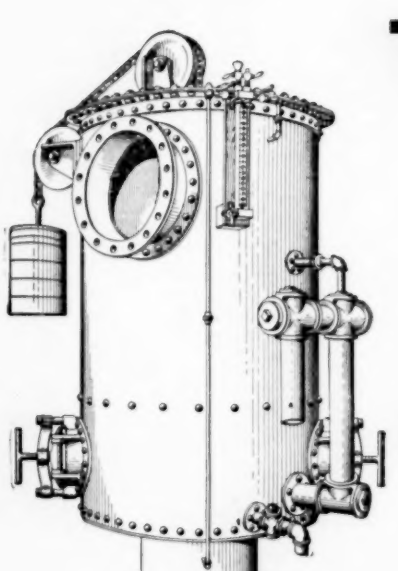

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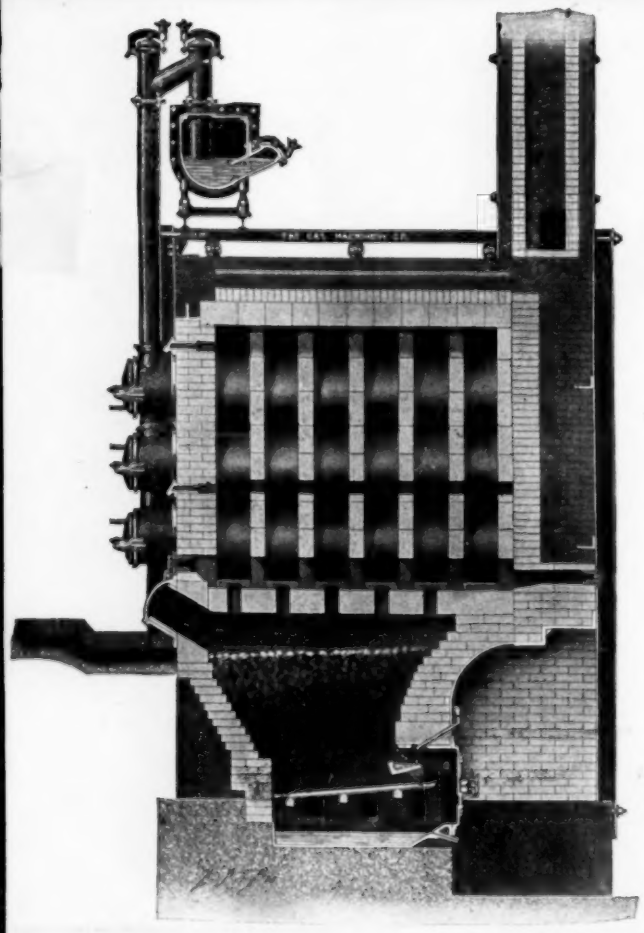

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THE AMERICAN
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VOL. CIII., No. 1. NEW YORK, JULY 5, 1915. WHOLE No. 2,091

THE COMPOSITION OF GAS IN RELATION TO THE PERFORMANCE OF THE BUNSEN BURNER.

ROBERT FFRENCH PIERCE.

About four years ago the writer became impressed by the fact that gases entirely similar as regards the customary specifications of gas quality and conditions gave such widely differing results in the incandescent gas lamp that it was practically impossible to obtain useful comparative data, except from lamps tested side by side upon the same day and at substantially the same hour. The series of tests undertaken with the object of determining, as far as possible, the nature and effects of the confusing and disturbing elements developed some facts that may be of interest in connection with the present discussion of standards of calorific value, and in view of this wider interest and the paucity of definite information on desirable specifications of gas quality, the writer feels justified in offering this data, however fragmentary, for consideration.

While the incandescent gas lamp is admirably suited in some respects for an investigation of the performance of the bunsen burner, the results so obtained must be taken with due consideration of its limitations. The efficiency of the most important processes involving the uses of gaseous fuel is a function of flame temperature, and the higher the temperature involved in the process the more greatly is the efficiency influenced by the flame temperature. We are perhaps justified in assuming that the relations of flame temperature to efficiency in the incandescent gas lamp and in other high temperature appliances such as broilers, furnaces for the heat treatment of metals, metal-melting furnaces, etc., are sufficiently similar to justify us in taking the relation in the former as at least an index of the relation in the latter group. In the case of bake ovens, water heaters and appliances for processes involving comparatively low temperatures the efficiency is favorably affected by increased flame temperature, but to a very much smaller degree than in high temperature operations.

It is much easier to obtain the total light output of an incandescent mantle than to measure the average temperature of a bunsen flame, and the results are of a higher degree of accuracy. The performance of gases in an incandescent gas lamp, therefore, furnishes a convenient *indication* of their relative availability for other processes involving high temperatures.

In the test from which the results hereinafter set forth were drawn, a No. 71 Welsbach upright burner, fitted with a No. 197 mantle ($3\frac{1}{2}'' \times 1\frac{1}{8}''$) and straight (non-airhole) chimney 8″ long by 2″ diameter, was lighted, adjusted for maximum incandescence, and the horizontal candle-power measured daily from August 3, 1911, to November 21, 1911. It is assumed that during this period of intermittent burning no appreciable deterioration in mantle quality took place. The gas was tested daily for gross calorific value, specific gravity and candle-power (per 5 cubic feet per hour in open flame burner). The temperature and humidity of the air in the room were also ascertained. The gas used was carbureted water gas, and varied in calorific value between 463 and 666 B.T.U. per cubic foot, between 15.2 and 24.6 candle-power, and between .562 and .724 in specific gravity. The lamp, which was adjusted at each reading for maximum horizontal candle-power, gave between 94.4 and 108.8 horizontal candle-power on between 4.25 and 5.15 cubic feet per hour consumption. Atmospheric temperature varied between 60° and 84° F., and the humidity between 2.02 and 8.3 litres of water vapor per cbm. The gas pressure was maintained constant at 2.5″.

This test was planned with a view to demonstrating that calorific value, specific gravity and gas candle-power do not definitely specify a gas for commercial purposes.

It appears quite obvious that two gases may be identical as regards these particular qualities, yet so entirely different in composition that the resulting flame temperatures will differ greatly. However, the contrary opinion has been so often expressed that it was considered desirable to demonstrate the fact that specifications of these qualities were valueless for conveying any definite idea of the usefulness of the gas to the consumer.

Table I shows nine pairs of tests in which the greatest similiarity in calorific value, specific gravity and candle power of gas were obtained, the horizontal candle power corrected for atmospheric humidity by a method described later. It will be observed that there is no closer agreement of the results obtained with similar gases than between those from gases of entirely dissimilar specifications.

TABLE I.

No.	B. T. U.	S. G.	C. P.	Cons.	Corr. Hor. C. P.
3	522	.677	20.58	4.55	114.75
13	539	.659	20.46	4.58	116.5
20	542	.654	18.37	4.85	119.3
33	553	.651	18.36	4.64	117.4
21	541	.643	17.14	4.58	117.9
24	539	.653	17.37	4.73	115.5
28	541	.679	19.19	4.49	119.1
29	548	.671	19.29	4.55	116.8
31	604	.633	18.61	4.81	113.85
80	599	.627	18.53	4.48	114.76
32	593	.603	18.28	4.75	115.95
38	585	.609	18.54	4.79	117.5
58	600	.712	18.72	4.65	121.46
59	600	.724	18.39	4.64	118.67
62	610	.653	17.30	4.70	114.05
67	604	.640	17.44	4.46	115.8
64	603	.672	19.39	4.48	116.1
71	606	.685	19.42	4.39	115.5

For example, there is a difference of 2.4-candle power between tests 21 and 24 in which the gases differed by but ½ of 1% in calorific value, 1½% in specific gravity and less than 1½% in gas candle power; while between tests 3 and 62, the difference in candle power is but .7 while that between the calorific value of the gases is nearly 17% and between gas candle powers nearly 19%. It is quite obvious that specification of calorific value, specific gravity and gas candle power can never be taken seriously as predetermining the performance of incandescent lighting appliances or comparative tests.

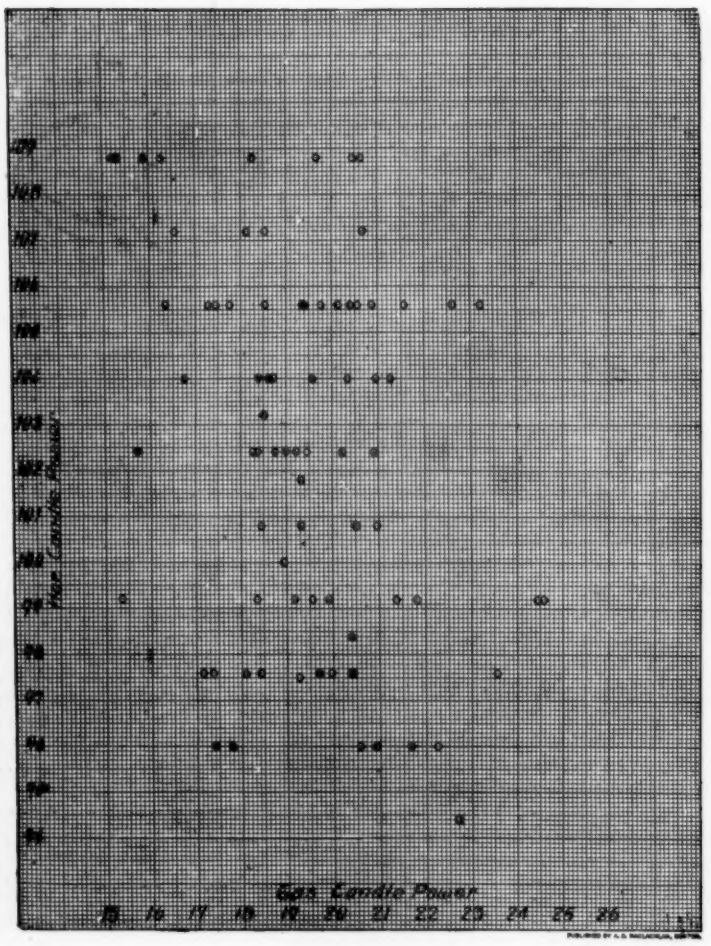


Fig. 1.—Gas Candle Power ; and Light from Mantle.

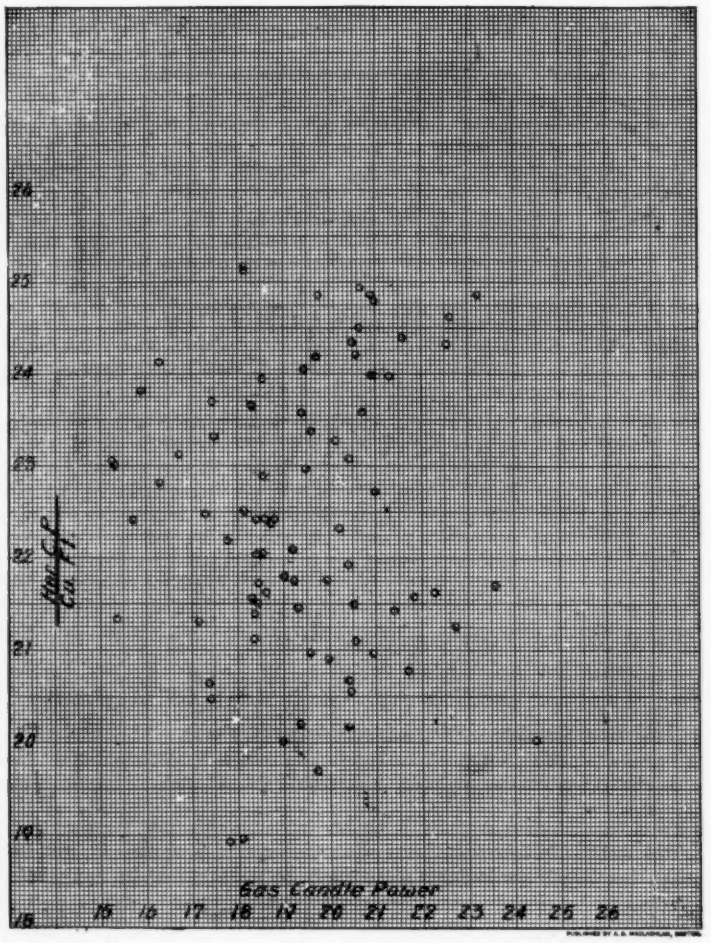


Fig. 2.—Gas Candle Power ; and Candle Power per Cubic Feet.

One frequently hears the opinion expressed that in the ordinary course of manufacture of carburetted water gas the gas candle power tends to vary, in a way, with the calorific value.

In this connection, the following table may be of interest :

TABLE II.

Test No.	Gas, C. P.	Calorific Value.
2	24.46	567
63	15.7	592
82	16.3	614
60	18.40	654
41	20.40	450
61	16.32	602
56	20.99	612
53	16.74	612

These are not isolated and peculiar discrepancies, but typical. They will not surprise the gas engineer, but will probably conflict with the existing opinions of many whose contact with the manufacturing department of the industry is but casual. The connections between gas candle power, and the luminosity and efficiency of the incandescent gas lamp is even more strikingly shown in Figs. 1 and 2.

The influence of humidity appears to be quite consistent (within the limits encountered) if we may assume that the irregularities due to varying gas quality tend to counterbalance each other. In Fig. 3 the small circles represent individual readings, and the larger " crossed " circles the average humidity for each horizontal candle power. A curve drawn as closely as possible to the average points has the formula :

$$I = -2.716\ h + 116.364.$$

Where I = horizontal candle-power
h = absolute humidity in litres per cbm.

which may be taken as the " humidity characteristic " of this particular lamp on an average carburetted water gas.

It will be recalled that Bond (Trans. A. G. I., 1912, p. 308) found that a similar lamp sustained a loss of .6% in candle-power for each litre of water vapor per cbm., as against 2.716 in absolute candle-power in the above formula. It is hardly possible to compare the two tests, as they were conducted under entirely different conditions. The effect of humidity was only a casual consideration in the test here reported, and the range of humidity was rather narrow. The writer has no theory to advance in explanation of the discrepancy, but suggests that consistent differences in gas quality might account for it. The gas with which Mr. Bond worked probably had a consistently higher hydrogen content than the gas used in this test, and it is conceivable that the result of the addition of water vapor to a flame already high in this constituent might be less marked than in a flame containing less water vapor as a product of combustion.

The most interesting data obtained from the test related to the effect of varying calorific value upon the *thermal* efficiency of the lamp—that is, the light output per B.T.U. input. The results are shown in Fig. 4. As one would expect, the duty in horizontal candle-power per B.T.U. decreased with increased calorific value. It will be seen from an inspection of the figures for consumption at various selected points (shown in the squares) that the increase in B.T.U.'s input was mainly due to increased calorific value of the gas, as the consumption tended toward a constant figure.

The formula of the curve drawn as closely as possible to the average values is—

$$D = -.00001375\ H + .0752$$

When D = Duty in horizontal candle-power per B. T. U.
H = Total heat input per hour (calorific value of gas consumption).

It has been shown by St. Claire De Ville (See Trans. A. G. I., 1911, Vol. II, pp. 315, *et seq.*) that the duty of an incandescent gas lamp expressed in light output per B. T. U. per hour input has a greater tendency toward a constant value with gases of varying quality than any other feature of lamp performance, *provided the ratio between gas and primary air is so adjusted as to secure maximum duty with each gas.* Interesting as this may be from a scientific standpoint, and even from a practical standpoint where air under pressure is available, it has no practical bearing upon the atmospheric burner, for the primary air is limited by the entraining power of the injector. Since the proportion of air pressure (or " blast ") burners in actual use is insignificant, it would appear that any discussion of the relative economy of different gases should be based upon the performance of the atmospheric burner. These re-

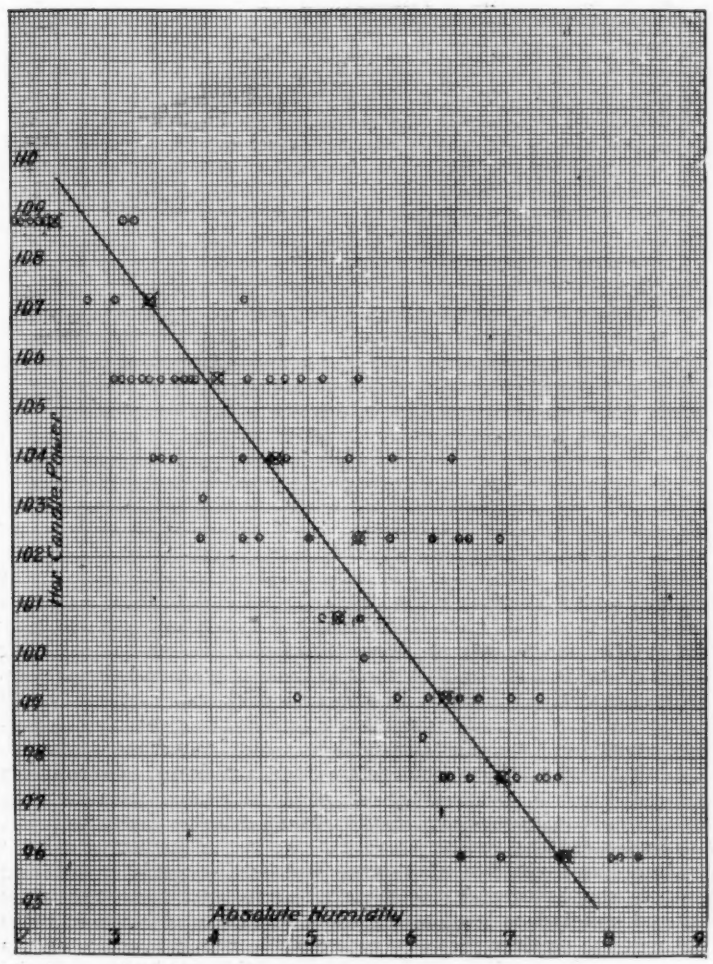


Fig. 3.—Humidity Characteristic of Lamp.

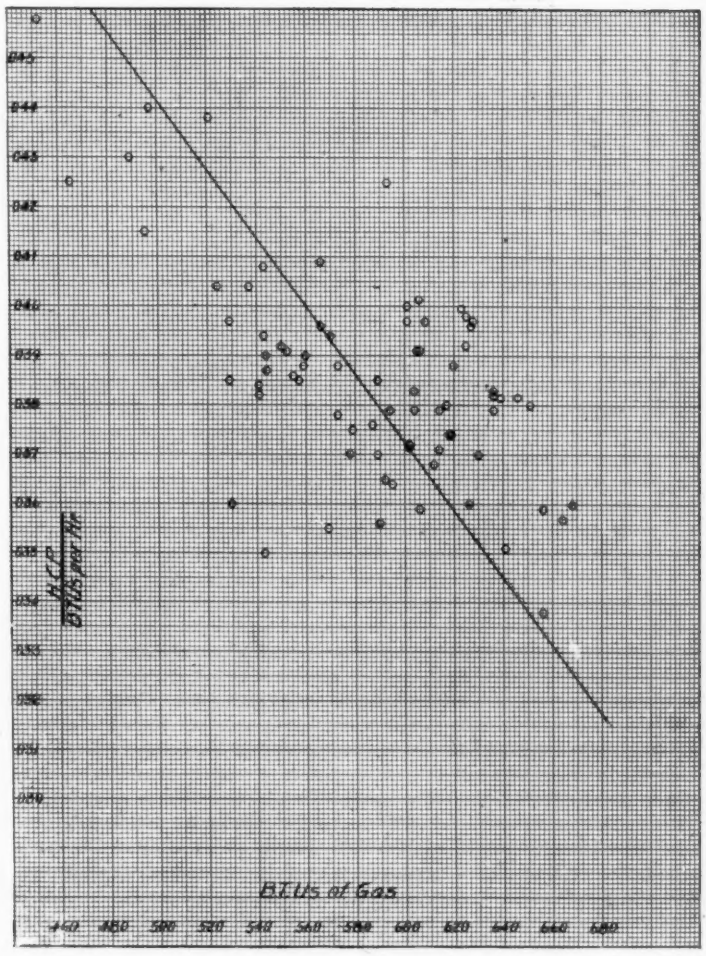


Fig. 5.—Decreased Duty with Increased Calorific Value.

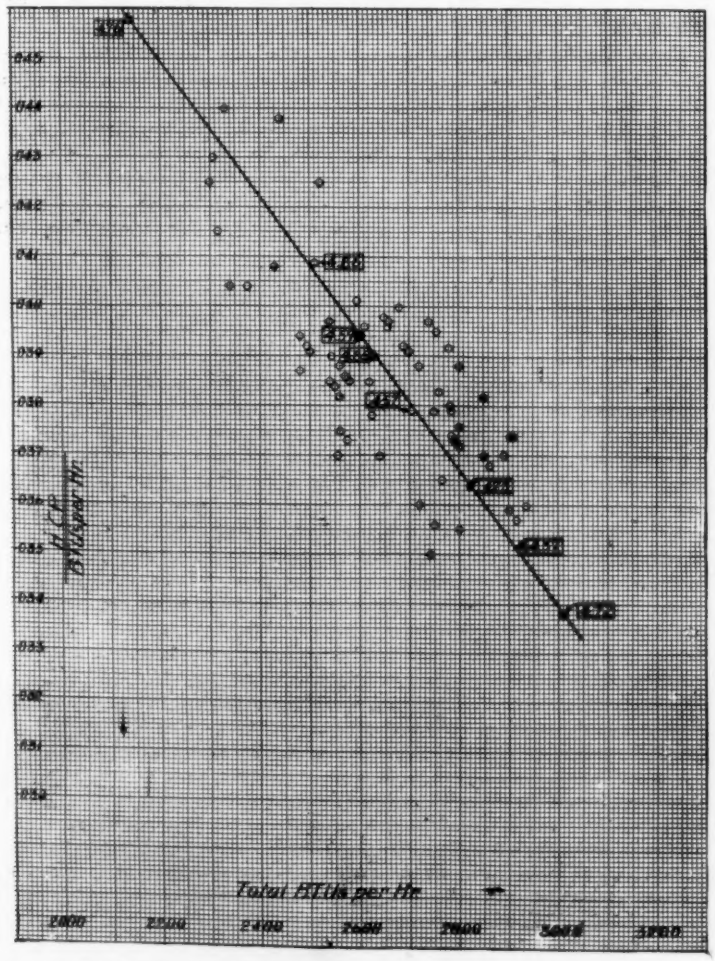


Fig. 4.—Calorific Value and Thermal Efficiency.

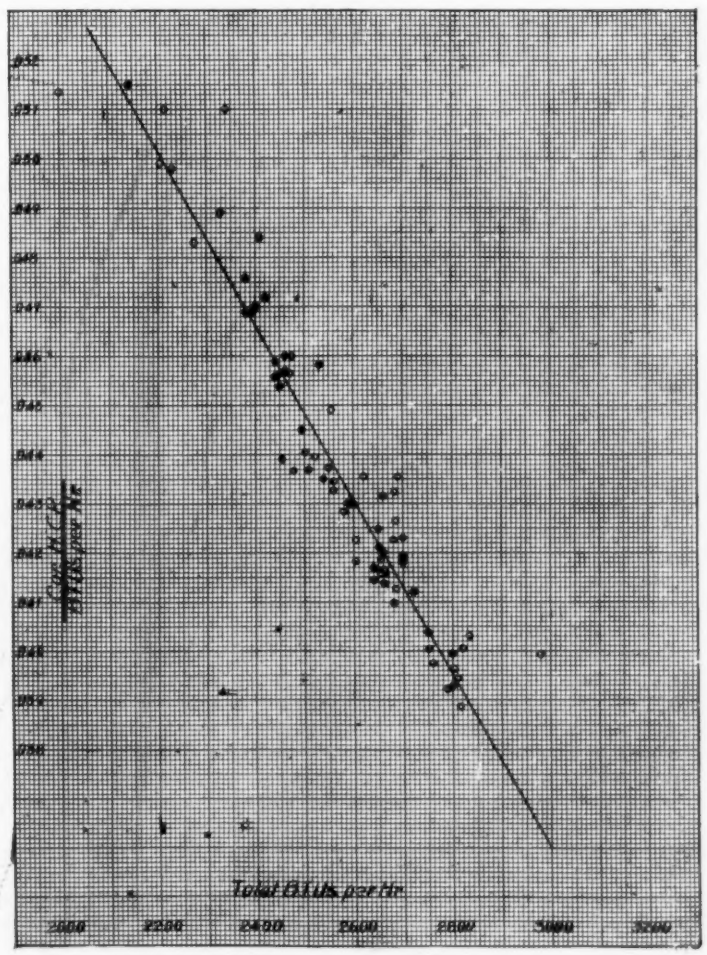


Fig. 6.—Results Corrected for Dry Air.

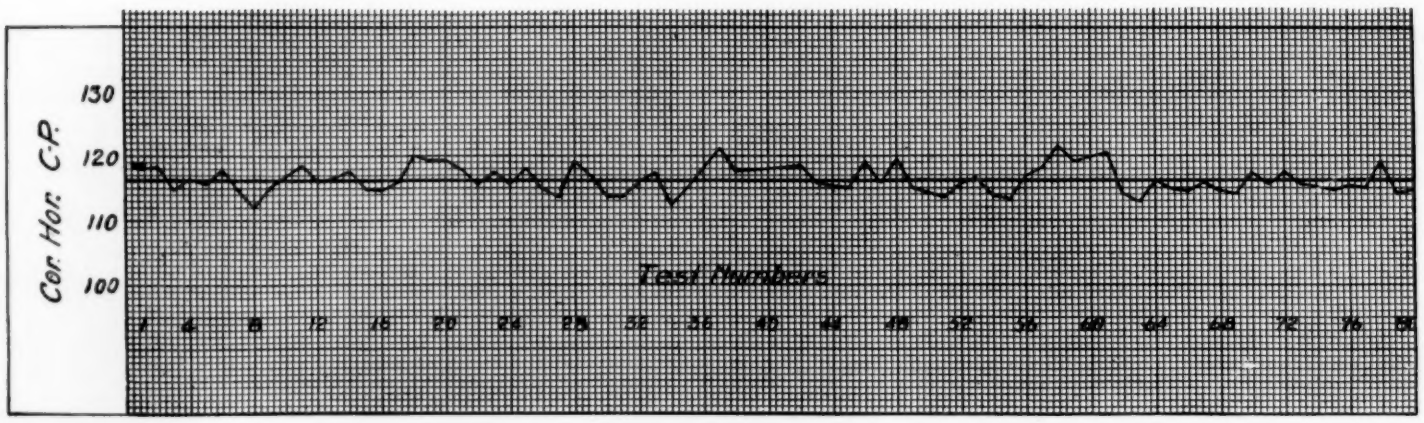


Fig. 7.—Candle Power Figures Corrected for Humidity.

sults may therefore furnish a suitable starting-point for a discussion of the relative economy of various gases in high-temperature appliances. Their direct and specific application to the bearing of illumination requirements on the selection of practicable standards of gas service is obvious.

Fig. 5 shows the variation in duty with the calorific value of the gas. At first glance, the data do not seem sufficiently consistent to justify the drawing of a curve assumed to represent average conditions. It will be shown later, however, that these discrepancies are principally due to a variable outside the gas, and that, as far as the influence of gas quality is concerned, a curve having the formula

$$D = - .0000692\ C + .08275$$

Where D = duty in Hor. C. P. per B. T. U. per hour,
and C = Calorific value of gas in B. T. U. per cu. ft.

represents, within very narrow limits the behavior of the lamp under consideration with reference to *changes in gas quality only.*

The most interesting feature of this curve is the fact that the decrease in duty with increase in calorific value is exactly counterbalanced by the latter. For example, comparing gases of 480 and 660 B. T. U.'s per cubic feet respectively, it is seen that while the duty expressed in hor. c. p. per B. T. U. with the former (.04555) is 37.5% greater than that with the latter (.03312), the B. T. U. per cu. ft. in the latter (660) are 37.5% greater than in the former (480). Thus the cost per candle power hour of producing light in the incandescent burner *is independent of the calorific value of the gas.* Taking the two gases cited above, the costs per candle power with gas at $1 per 1,000 cu. ft. in each case are

$$\frac{.001}{.04555 \times 480} = .0000458 \text{ and } \frac{.001}{.03312 \times 660} = \$.0000458.$$

In short, as far as incandescent lighting is concerned, it does not make the least difference to the customer whether he pays $1 per 1,000 cu. ft. for gas of 480 B. T. U.'s or $1 per 1,000 cu. ft. for gas of 660 B. T. U.'s. Incidentally, this furnishes one of the strongest inducements to the gas industry to expand the field of gas lighting. It is recognized by every competent gas engineer that a large proportion of the obstacles encountered in rendering good gas service to the consumer are directly due to the condensible hydrocarbons present in gases of high candle power or of high calorific value. In the case of gas lighting service the preponderance of troubles due to condensible hydrocarbons is so overwhelming that all other causes appear insignificant. Since it has been shown that incandescent lighting customers gain nothing whatever from increases in calorific value, even at the same price, but on the contrary suffer an actual loss in the quality of service received, the existence of a large and well established lighting business should furnish the most effective argument to Public Utility Commissions against imposing standards of calorific value that militate against the best and most economical service of the consumer. For at least 50% of the available gas business in the United States, the calorific value standard would be as useless, meaningless, absurd and ridiculous as the present candle power standard.

From the data thus far presented it would appear that the incandescent gas lamp adjusted at all times for maximum incandescence tends to be essentially a constant consumption, constant light output apparatus, independent of changes of gas quality, calorific value, specific gravity, etc. That such irregularities and discrepencies as occur are largely due to atmospheric humidity is shown by correcting the data for humidity according to the formula obtained from Fig. 3. Fig. 4, corrected to dry air conditions, be-

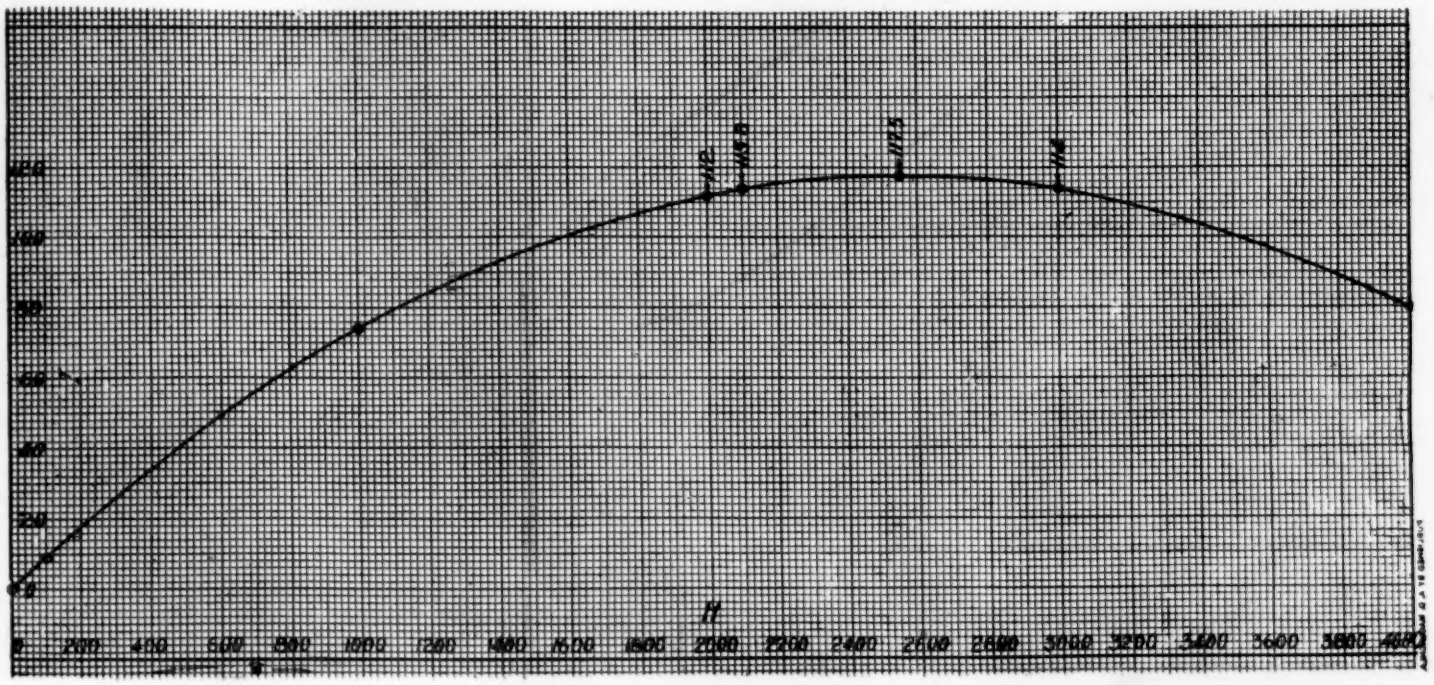


Fig. 8.

comes Fig. 6. Here it will be seen that all points lie sufficiently close to a line having the formula

$$D = -.000018\ H + .092$$

to justify the definite statement that within the limits of the test, this formula represents a definite characteristic of the incandescent gas lamp. That the slope of the curve in Fig. 6 is greater than that in Fig. 4 is probably due to the fact that the gases of lower calorific value are comparatively poor in hydrogen, and may be expected to gain more by a humidity correction than those richer in hydrogen. This hypothesis is supported by a comparison of the writer's humidity correction factor for water gas with that of Bond for mixed coal and water gas.

Fig. 7 shows the results of correcting the original candle power figures for humidity. This conclusively proves that within the conditions and limitations of the test the incandescent gas lamp is essentially a constant candle power apparatus. The maximum candle power (121.46) is but 8.4% greater than the minimum (112.0). The mean (116.3) agrees closely with the result obtained by calculation from the formula

$$I = -2.716\ h + 116.364$$

from which the value for dry air is 116.364.

We may therefore fix the standard rating of a No. 71 burner with a No. 197 mantle and No. 42 non-air-hole chimney on carburetted water gas and in dry air as follows:

Horizontal candle-power,	116.3
Consumption,	4.6
Humidity correction factor,	—2.716 per litre per cbm.

The range of variation in consumption from the mean of the test (4.584) is somewhat disappointing, being from — 7.3% to + 12.1%. While this variation apparently bears no definite variation to any of the qualities thus far considered, there appears to be some hope of devising a specification which shall narrow the range of effect of unknown variables to within much narrower limits. This will receive consideration in a future contribution. For the present we can say that neither gas candle-power, specific gravity or calorific value are of the slightest value either in predetermining the performance of a lamp or in fixing standards of service for gas lighting.

It is particularly interesting to note the close agreement between deductions from the various formulae, independently obtained; and in no case was a curve redrawn to agree more closely with other data, nor were any comparative calculations made before drawing the curves. In each case, they represent purely an ocular estimate of the apparent optimum curve.

There are three values for horizontal candle power in dry air, obtained by three independent methods.

I. The mean of the corrected candle powers as observed during the test; which is 116.3.

II. The "dry air" candle power as calculated from the formula

$$I = -2.716\ h + 116.364$$

III. The results of calculation from the formula $D = -.000018\ H + .092$ to obtain the average value of the hor. c. p. over the range of the test—from 2,100 to 3,000 B. T. U.'s per hour heat input. The close agreement between (I) and (II) has been noted above. The calculation from III follows.

$$D = \frac{I}{H} = -.00008\ H + .092$$

where D = Duty in hor. c. p. per B. T. U. input per hour
H = B. T. U.'s input per hour
I = Hor. candle power (corrected for humidity)

$$I\ av. = \frac{-.000018\ H^2 + .092\ H}{3000}$$

$$I\ av. = \frac{\int_{H=2100}^{H=3000} \left[.000018\ H^2 + .092H\right] dH}{2100}$$

$$= \frac{-.00006\ H^3 + .046\ H^2 \Big|_{H=2100}^{H=3000}}{900}$$

$$= \frac{104706}{900} = 116.34$$

Calculations of the above formula between H = 2100 and H = 3000 yield the following data:

H = 2100,	I = 113.8
H = 2555,	I = 117.5 = maximum value
H = 3000,	I = 114.

The statement that I is essentially a constant is therefore practically correct *within the limits of the test*. The formula expressing the value of I is however an equation of the second degree. The parabola corresponding to the formula between H = o and H = 4000 is shown in Fig. 8.

Without hazarding any guesses as to the range over which this formula is valid, it may be said that such incomplete results as are available concerning the performance of this lamp on natural gas and on water gas indicate that the formula holds, at least approximately, considerably outside the limits of this test.

Unfortunately, the tests made were upon a type of unit that is not of particular commercial interest at the present time. As stated above, they were made nearly four years ago, and mainly for the purpose of confirming the writer's hypotheses. He did not consider at that time that work upon this subject would command sufficient interest to justify the labor of preparing the matter for publication, although the importance of the subject was obvious. Recent interest in the question of better service standards make it appear that the data may be useful in that connection.

Condensation of Gasoline from Natural Gas.

Bulletin 88 of the Bureau of Mines treats of a method of preventing some of the waste of natural gas incidental to oil mining. This method, the condensation of gasoline from natural gas, offers a profitable means of utilizing some of the oil-well gas now wasted. The most desired constituent of crude oil is obtained, the production of oil is not hindered, and the gas, after the extraction of gasoline, can be used to drive pumps or delivered to pipe lines for uses to which natural gas is ordinarily put, generally with its fuel value lessened only slightly.

The authors say: Gas may be found in a sand, and separate from oil. It may be found in more than one sand separate from the oil, or the gas sand may be just above and in contact with the oil sand. A given sand may produce oil and gas in one place, and in another part of the territory gas only.

"Gas may come from the same sand as the oil, and it is this occurrence that the authors desire to emphasize, for under these conditions the gas is frequently mixed with enough gasoline to warrant the erection of a plant for condensing it.

"The gas usually wastes to the atmosphere through the space between the casing of the well and the tubing inserted for the removal of the oil. This gas is the so-called 'casing head gas.' At the beginning of oil flow, when the flow is natural, a large quantity of gas escapes through the air through the same tubing as the oil. Where the gas finds its exit apart from the oil, it is a simple matter to make pipe connections between the casing head and the point where the gas is to be utilized.

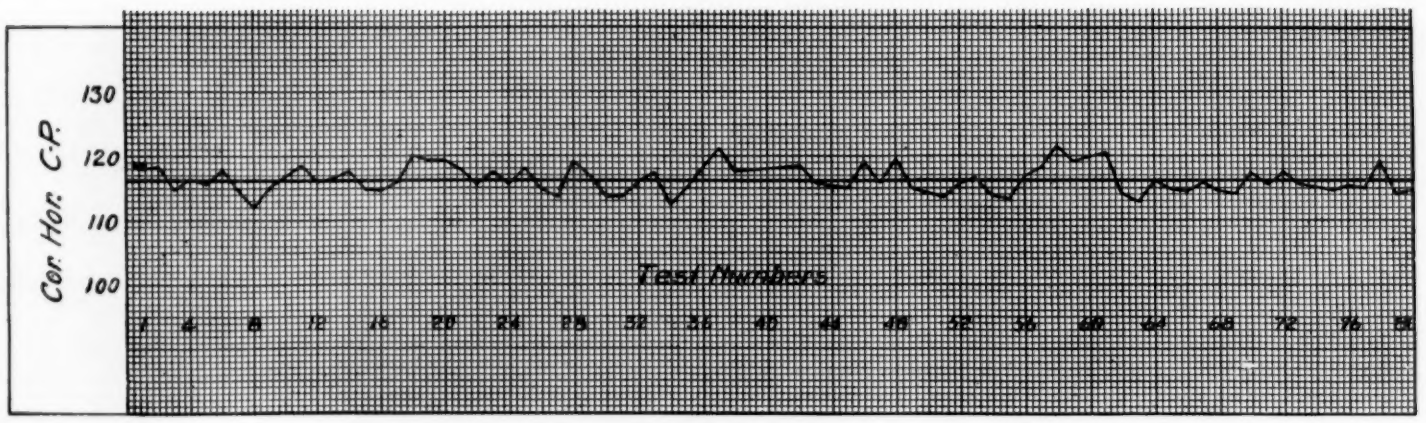
"When gas comes with the oil in the flow pipe, the two can be separated by means of a gas trap. The oil, entering the top of a drum, settles to the bottom and is withdrawn, and the gas is taken off at the top. Many plants in California utilize this gas for condensing gasoline.

"Oil wells that have passed the flowing stage and are being pumped may still continue to give off much gas at the casing head. The quantity may vary from little or nothing at one well to 500,000 cubic feet or more at others. When enough gas is available, it is used for pumping on the lease and the excess wasted. A steam pumping engine of 50 horse-power requires about 25,000 cubic feet of gas for 10 hours' operation, and from 12 to 15 cubic feet is needed per horse-power for gas engines used for pumping oil wells. If there is not enough gas for working the pumps, it is allowed to waste, or perhaps some is used for heating and lighting a few scattered houses on the lease.

"The efficient utilization of the wasting casing-head gas is ordinarily a difficult problem. The many miles of pipe that would have to be laid to transport it from a field is usually an unwarranted expense, although some towns, notably Warren, Pa., and Sistersville, W. Va., are lighted and heated largely with casing-head gas.

"In general, however, the oil man considers casing-head gas as waste gas, and its escape necessary to permit the maximum flow of oil into the well from the surrounding strata."

The bulletin also treats of the effect of drilling neighboring wells; the effect of formation of waxy sediment; the history of the making of gasoline from natural gas; the chemistry of natural gas, and other matters along these lines.



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In short, as far as incandescent lighting is concerned, it does not make the least difference to the customer whether he pays $1 per 1,000 cu. ft. for gas of 480 B. T. U.'s or $1 per 1,000 cu. ft. for gas of 660 B. T. U.'s. Incidentally, this furnishes one of the strongest inducements to the gas industry to expand the field of gas lighting. It is recognized by every competent gas engineer that a large proportion of the obstacles encountered in rendering good gas service to the consumer are directly due to the condensible hydrocarbons present in gases of high candle power or of high calorific value. In the case of gas lighting service the preponderance of troubles due to condensible hydrocarbons is so overwhelming that all other causes appear insignificant. Since it has been shown that incandescent lighting customers gain nothing whatever from increases in calorific value, even at the same price, but on the contrary suffer an actual loss in the quality of service received, the existence of a large and well established lighting business should furnish the most effective argument to Public Utility Commissions against imposing standards of calorific value that militate against the best and most economical service of the consumer. For at least 50% of the available gas business in the United States, the calorific value standard would be as useless, meaningless, absurd and ridiculous as the present candle power standard.

From the data thus far presented it would appear that the incandescent gas lamp adjusted at all times for maximum incandescence tends to be essentially a constant consumption, constant light output apparatus, independent of changes of gas quality, calorific value, specific gravity, etc. That such irregularities and discrepencies as occur are largely due to atmospheric humidity is shown by correcting the data for humidity according to the formula obtained from Fig. 3. Fig. 4, corrected to dry air conditions, be-

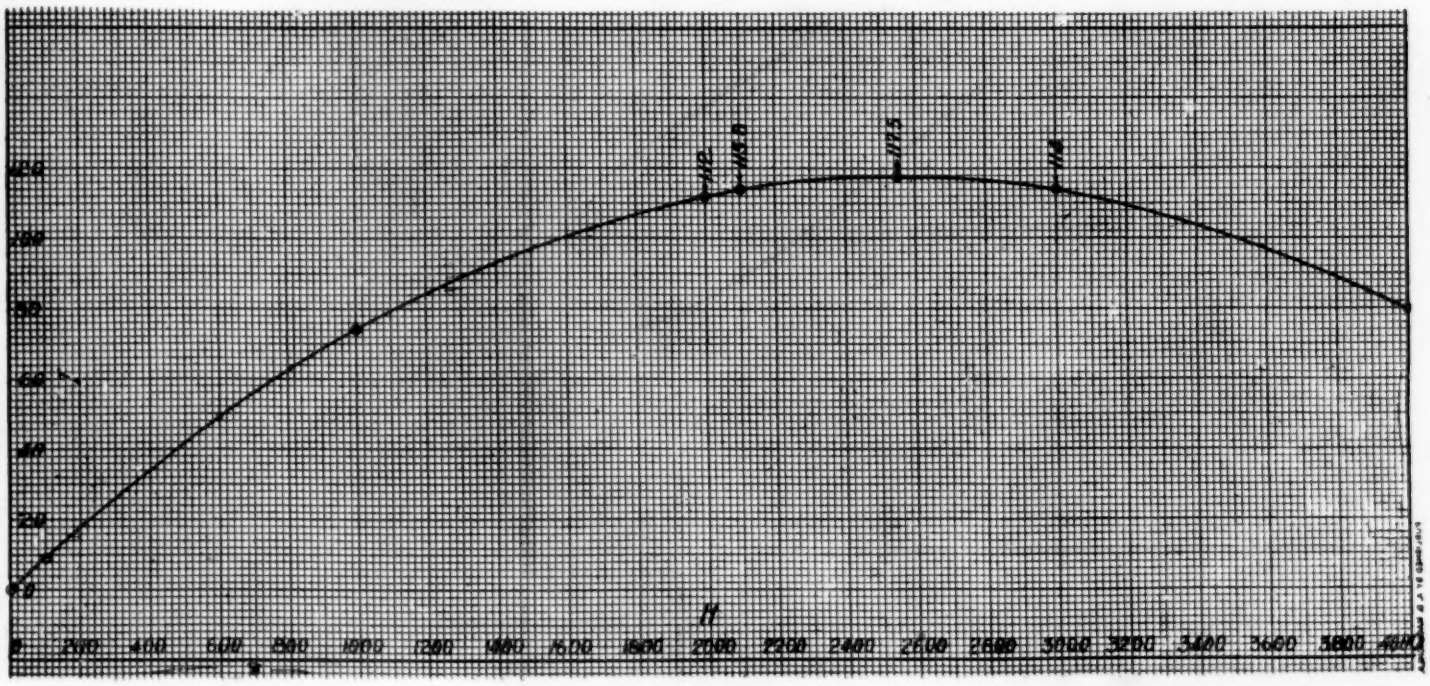

Fig. 8.

comes Fig. 6. Here it will be seen that all points lie sufficiently close to a line having the formula

$$D = -.000018\ H + .092$$

to justify the definite statement that within the limits of the test, this formula represents a definite characteristic of the incandescent gas lamp. That the slope of the curve in Fig. 6 is greater than that in Fig. 4 is probably due to the fact that the gases of lower calorific value are comparatively poor in hydrogen, and may be expected to gain more by a humidity correction than those richer in hydrogen. This hypothesis is supported by a comparison of the writer's humidity correction factor for water gas with that of Bond for mixed coal and water gas.

Fig. 7 shows the results of correcting the original candle power figures for humidity. This conclusively proves that within the conditions and limitations of the test the incandescent gas lamp is essentially a constant candle power apparatus. The maximum candle power (121.46) is but 8.4% greater than the minimum (112.0). The mean (116.3) agrees closely with the result obtained by calculation from the formula

$$I = -2.716\ h + 116.364$$

from which the value for dry air is 116.364.

We may therefore fix the standard rating of a No. 71 burner with a No. 197 mantle and No. 42 non-air-hole chimney on carburetted water gas and in dry air as follows:

Horizontal candle-power,	116.3
Consumption,	4.6
Humidity correction factor,	—2.716 per litre per cbm.

The range of variation in consumption from the mean of the test (4.584) is somewhat disappointing, being from — 7.3% to + 12.1%. While this variation apparently bears no definite variation to any of the qualities thus far considered, there appears to be some hope of devising a specification which shall narrow the range of effect of unknown variables to within much narrower limits. This will receive consideration in a future contribution. For the present we can say that neither gas candle-power, specific gravity or calorific value are of the slightest value either in predetermining the performance of a lamp or in fixing standards of service for gas lighting.

It is particularly interesting to note the close agreement between deductions from the various formulae, independently obtained; and in no case was a curve redrawn to agree more closely with other data, nor were any comparative calculations made before drawing the curves. In each case, they represent purely an ocular estimate of the apparent optimum curve.

There are three values for horizontal candle power in dry air, obtained by three independent methods.

I. The mean of the corrected candle powers as observed during the test; which is 116.3.

II. The "dry air" candle power as calculated from the formula

$$I = -2.716\ h + 116.364$$

III. The results of calculation from the formula $D = -.000018\ H + .092$ to obtain the average value of the hor. c. p. over the range of the test—from 2,100 to 3,000 B. T. U.'s per hour heat input. The close agreement between (I) and (II) has been noted above. The calculation from III follows.

$$D = \frac{I}{H} = -.00008\ H + .092$$

where D = Duty in hor. c. p. per B. T. U. input per hour
H = B. T. U.'s input per hour
I = Hor. candle power (corrected for humidity)

$$\text{I av.} = \frac{-.000018\ H^2 + .092\ H}{3000}$$

$$\text{I av.} = \frac{\int_{H=2100}^{H=3000} \left[-.000018\ H^2 + .092H\right] dH}{3000 - 2100}$$

$$= \frac{-.00006\ H^3 + .046\ H^2 \Big|_{H=2100}^{H=3000}}{900}$$

$$= \frac{104706}{900} = 116.34$$

Calculations of the above formula between H = 2100 and H = 3000 yield the following data:

H = 2100, I = 113.8
H = 2555, I = 117.5 = maximum value
H = 3000, I = 114.

The statement that I is essentially a constant is therefore practically correct *within the limits of the test*. The formula expressing the value of I is however an equation of the second degree. The parabola corresponding to the formula between H = o and H = 4000 is shown in Fig. 8.

Without hazarding any guesses as to the range over which this formula is valid, it may be said that such incomplete results as are available concerning the performance of this lamp on natural gas and on water gas indicate that the formula holds, at least approximately, considerably outside the limits of this test.

Unfortunately, the tests made were upon a type of unit that is not of particular commercial interest at the present time. As stated above, they were made nearly four years ago, and mainly for the purpose of confirming the writer's hypotheses. He did not consider at that time that work upon this subject would command sufficient interest to justify the labor of preparing the matter for publication, although the importance of the subject was obvious. Recent interest in the question of better service standards make it appear that the data may be useful in that connection.

Condensation of Gasoline from Natural Gas.

Bulletin 88 of the Bureau of Mines treats of a method of preventing some of the waste of natural gas incidental to oil mining. This method, the condensation of gasoline from natural gas, offers a profitable means of utilizing some of the oil-well gas now wasted. The most desired constituent of crude oil is obtained, the production of oil is not hindered, and the gas, after the extraction of gasoline, can be used to drive pumps or delivered to pipe lines for uses to which natural gas is ordinarily put, generally with its fuel value lessened only slightly.

The authors say: Gas may be found in a sand, and separate from oil. It may be found in more than one sand separate from the oil, or the gas sand may be just above and in contact with the oil sand. A given sand may produce oil and gas in one place, and in another part of the territory gas only.

"Gas may come from the same sand as the oil, and it is this occurrence that the authors desire to emphasize, for under these conditions the gas is frequently mixed with enough gasoline to warrant the erection of a plant for condensing it.

"The gas usually wastes to the atmosphere through the space between the casing of the well and the tubing inserted for the removal of the oil. This gas is the so-called 'casing head gas.' At the beginning of oil flow, when the flow is natural, a large quantity of gas escapes through the air through the same tubing as the oil. Where the gas finds its exit apart from the oil, it is a simple matter to make pipe connections between the casing head and the point where the gas is to be utilized.

"When gas comes with the oil in the flow pipe, the two can be separated by means of a gas trap. The oil, entering the top of a drum, settles to the bottom and is withdrawn, and the gas is taken off at the top. Many plants in California utilize this gas for condensing gasoline.

"Oil wells that have passed the flowing stage and are being pumped may still continue to give off much gas at the casing head. The quantity may vary from little or nothing at one well to 500,000 cubic feet or more at others. When enough gas is available, it is used for pumping on the lease and the excess wasted. A steam pumping engine of 50 horse-power requires about 25,000 cubic feet of gas for 10 hours' operation, and from 12 to 15 cubic feet is needed per horse-power for gas engines used for pumping oil wells. If there is not enough gas for working the pumps, it is allowed to waste, or perhaps some is used for heating and lighting a few scattered houses on the lease.

"The efficient utilization of the wasting casing-head gas is ordinarily a difficult problem. The many miles of pipe that would have to be laid to transport it from a field is usually an unwarranted expense, although some towns, notably Warren, Pa., and Sistersville, W. Va., are lighted and heated largely with casing-head gas.

"In general, however, the oil man considers casing-head gas as waste gas, and its escape necessary to permit the maximum flow of oil into the well from the surrounding strata."

The bulletin also treats of the effect of drilling neighboring wells; the effect of formation of waxy sediment; the history of the making of gasoline from natural gas; the chemistry of natural gas, and other matters along these lines.

RELATIONS BETWEEN GAS COMPANIES AND DEALERS.

[Some of tho Discussion at the Mid-Year Conference, N. C. G. A.]

1. Should gas companies discontinue the sale of gas appliances and turn the business over to the dealers?

2. Should gas companies engage in the sale of other merchandise than gas appliances?

3. Can dealers compete with gas companies in the sale of gas appliances on the cash basis and on the installment basis, considering the fact that gas companies could carry a stock of appliances and also are in a position to make connections and maintain inspection service?

4. Should dealers be co-operated with, even though selling appliances not handled by the gas company but which may be standard appliances and approved?

5. Is it possible, and how can the sale of approved appliances by the dealer be regulated?

MR. PHILMER EVES.—The relation between gas companies and dealers is of vital importance, and seems to become more emphasized as our Association develops its wonderful influence upon the commercial department.

At this stage of phenomenal growth and expansion it would seem most inopportune and a decided mistake for the gas companies to discontinue the sale of gas appliances. To hand the business over to the dealers would put an end to a large part of the most useful work of this Association and produce a serious check upon our commercial activities.

The main object of the sale of gas appliances is to increase the output of gas. To do this it has been, as a rule, necessary to sell them at low prices. Every one knows that any loss could be avoided by turning the business over to the dealers. The question, therefore, is: Would it be *profitable* to drop the sale of appliances? This is perhaps a matter for the individual gas company to determine. We believe that the large majority of gas companies would consider that so-called loss their most productive investment. We, for example, have recently concluded a gas water heater campaign in New Haven, where, at a reasonable loss in the total cost of selling and installing, over 1,200 heaters were sold. These water heaters will be gas consumers for years to come, so that the expense of selling them is more than warranted. How many water heaters would the dealer have sold in the same brief period? The same argument applies to the thousands of campaigns carried on by gas companies all over the country. The general apathy of dealers toward gas appliances, the lack of special training in their various uses, the necessity for instruction to customers and the special knowledge and care required to buy, sell and install appliances, in order to make not only customers but permanent and profitable gas consumers, are among the serious objections to the transfer of this business from the gas company to the dealers. But gas companies as a rule have been selling appliances at a lower price than the dealers could afford; and this has created a feeling of dissatisfaction among the dealers. This dissatisfaction has created antagonism against the gas companies by the dealers, who are generally business men of influence in the community. It has even been argued that this pernicious opposition more than offsets the mere financial profits the gas companies derive from the use of the appliances which they have sold at a loss, by its insidious and far-reaching effect upon the attitude of the public. A careful consideration of this problem would suggest that co-operation with the dealers could be best and most profitably accomplished by the gas company adopting a selling price that would bring the same money profit from the sale that the dealers get. It is more and more the opinion of experienced gas men that the time for selling appliances at a loss or even at a small profit, has gone by. Gas is a necessity, a boon and an economy in the home and the business. Why not make, gradually perhaps, a change in our methods of figuring cost, selling prices and profits, and bring the New Business Department up to a self-supporting basis? The public is always willing to pay for service, and will pay the real cost of that service. This would encourage the dealers, who of course have to consider these costs and profits. It would at least bring about a closer relationship that would be beneficial to the dealers and the gas industry generally.

Referring to the second item—experience has proved that gas companies should handle some things that do not actually consume gas. For example, the boards on which fish, steak and other appetizing dishes are "planked" should be offered to gas consumers to encourage them to use the gas broiler. Shallow pans for baking biscuits, etc., should be kept for sale because of the advantage of preventing faulty baking by the use of the deep pans that are too generally used. And what gas company would abandon the sale of the small but useful toaster, or the domestic cake, griddle, or the handy little iron heater plate? Handling combination cooking vessels shows the gas company's willingness to give consumers the most economical devices. This counts in the minds of the gas consumers, and brings its reward in good will and the good word passed to others.

The third question is partly answered in replying to item (1). Dealers are more willing to adopt the installment plan, as the price for the appliances is being brought up to a more profitable figure. All connections, however, should be made by the gas company or by a competent plumber on a profitable basis.

The fourth item. The sale of gas appliances that are approved by the local gas company should be encouraged by the closest and fairest co-operation. It is generally found that a spirit of co-operation between the gas company and the dealers who sell good gas-burning appliances tends to bring the standard of gas appliances, especially lighting appliances, up to a higher plane. The cheap rubbish, of which so much is sold and used to the detriment of the gas business, would gradually be abandoned for higher grade goods. In New Haven the Advertising Department is taking up co-operative work as a means of educating the dealers to select the most modern and economical appliances.

A suggestion for the regulation of the sale of *approved* appliances by the dealers (item 5) is the payment of such a commission or bonus on the sale of satisfactory appliances, to induce him to abandon the sale of cheap and harmful goods. This would entail an expense to the company, but would be offset by the revenue from higher prices in the sale of appliances by the company's New Business Department. This expense would also be warranted by the increased revenue from the larger sale of gas through amicable relations in the community, and by the general confidence and profitable satisfation that come from the best grade service.

Perhaps no two gas companies can adopt exactly the same rules, but we believe that gas companies should receive more for the gas appliances they sell, and should take steps to secure as many co-operating dealers in gas appliances as possible.

J. B. MYERS—In Philadelphia we had for a number of years a plan for the sale of appliances through department stores and dealers under which we paid them a commission of $2 on a gas range, and we made the connections free. Afterwards we discontinued the commission but gave them free connections. Finally we arranged that they could buy appliances from our stock including delivery and connection at a price on which they could make a reasonable profit. Finally we got to the point where they could make from $2.25 on a small gas range, to $6 or $7 on a large one. That worked quite well until about a year ago when there was a special sale of ranges, and the reduction to the consumer did not take into consideration the reduced price to the dealer; and since then we have had trouble with the dealer cutting prices and putting in ranges of inferior types. Our arrangement also allows the dealer to carry a stock and we connect the ranges he sells at a stipulated price that is below our average cost. This plan has worked out very satisfactorily; but in spite of this, dealers' sales have gradually decreased from year to year, while sales in our New Business Department have usually increased.

We have in Philadelphia the problem of equipping old residences with all-gas-kitchens. It is a question of heating the kitchen and giving a hot water supply for domestic purposes in the winter time. About 3 years ago we made a canvass of some 50,000 homes and found about 80% had coal ranges: in other words, we figured we had consumption from gas ranges for only 7 months in the year. We are doing all we can to secure all year round consumption and eliminate the coal range. We have had a working agreement with the Plumbers' Association of Philadelphia for some years which is not entirely satisfactory, although revised from time to time. We do no piping in new houses, but run short extensions up to 20 feet of pipe for lighting at the time we install fixtures. We do not install fixtures unless they are of incandescent burner type. We have trouble with the plumbers all the time as it is very difficult to

classify the work to please the plumbers and also to please us, and we frequently get mixed up in our bids. We concluded that it would be wise to consider the 1,200 registered plumbers in Philadelphia. We found that about 600 of them are in an Association that has about 90% of the purchasing power. Recently I met the President of the National body, the President and Secretary of the Local, and one or two committee members, and conferred as to how to overcome some of these difficulties. My real object was to get them to work with me for the all-gas-kitchen. Our idea is to have those 1,200 work as our representatives; to have them solicit that business, as well as our own men. The plumber will install the piping for furnace, tank heater or range connections, and for any gas appliances they will send the consumer to us with a card. In other words, we mean the plumber to get the profits on the sale of the appliance, If the consumer wants a monthly account for payment of the entire installation the plumber can turn the account over to us, and we will assume it. We think that by this method we can get the co-operation of the plumbers; and I believe they are more important to us than even the department stores or other dealers that have a space devoted to the display of gas appliances. I see no reason why we should not have all the registered plumbers in Philadelphia working with us. I think it would be a good idea also to turn over all the fuel piping in new houses to the plumbers. When you sell a range, including installation, it frequently makes difficulty with the plumbers, because they have their men putting in the other work while ours are working on the fuel end.

I think that it is important for gas companies to work in co-operation with the plumbers and the dealers. I also believe that the companies should control the sale of gas consuming appliances. I do not believe in going into the sale of appliances that properly belong with department stores or hardware dealers.

GEO. D. ROPER—Mr. Cortelyou struck the nail on the head yesterday when he mentioned several questions that have arisen in the manufacturing business. It is well known that all manufacturers, to say nothing of public service corporations, are selling service; and profit is of secondary consideration. With that in view it would be useless to talk about giving service and allowing department stores and plumbers to control the business The manufacturers would soon drift to profit instead of service, and would be looking only at the money end, which would mean a deterioration in the quality of the goods so rapidly that you would have to go back into the business to protect yourselves. Public service companies are generally recognized as selling service rather than a commodity, and a great factor in service is the appliance. The gas company may be in a position to manufacture gas of uniform quality and maintain distribution at uniform and satisfactory pressure, but if good appliances are not used its service may be altogether unsatisfactory. If it is true that the company should be interested in the maintenance of appliances, it follows, in my judgment, that it should be vitally interested in putting out the right appliances, and their proper installation.

In selling appliances to its consumers, a gas company has opportunities for dealing with them in a way that will win their good will. The selling of an appliance requires more time and brings into play entirely different forces and ideas than the transaction that usually takes place at the application window when one desires gas turned on. The sale of an appliance is the time for the cultivation of intimate relations. We meet the customer on the same ground that all commercial transactions are conducted and we must exert ourselves to please. In this endeavor to please and to guarantee what we furnish, we are calling forces into play that operate enormously for the furtherance of cordial relations.

The company that does not by every means seek to extend its business and increase the consumption of gas, is not fulfilling its whole duty, either to its stockholders or to the public. In the promotion of its business the sale of appliances is an essential factor. The appliance is a means to the end. To promote gas sales without dealing in the means by which they are promoted, is to omit the use of the most important weapon in carrying on the campaign.

To leave the sale of appliances to outside agencies, such as hardware dealers and department stores, would be to lose control of the kind of appliances that we wish consumers to have. I feel that without the influence of the gas company the quality of appliances would drop below the present standard in a short time, due to the competition in prices and to all sorts of new ideas being incorporated in new styles, many of which might be positively bad. The satisfaction that a customer will get out of his appliance, the reliability of the appliance and the facility of maintenance, are of vital interest to the gas company as well as to the consumer, and they depend largely on the influence that only that gas company can exert in the first introduction of the appliance.

WILLIAM M. CRANE—I cannot see how the gas company can get away from selling gas appliances. In the very nature of the business, they are not only interested in the sale of the appliance itself, but especially in the gas that flows through it. They not only get a profit on the article, which of course is very small, but the other profit continues year after year; and they are responsible at all times for the working of the appliance, whether it is filled up with grease or whether it is all burned out. The consumer looks to the gas company for help. A dealer is only interested in the sale of the article; his profit ceases there. If you go into a hardware store and ask for a coal stove and the dealer has coal and gas stoves side by side, he is not particular which one he sells. Why should he spend an hour talking in favor of the gas stove when he cannot make any more profit on it than on a coal stove? Therefore, it seems to me that the gas companies ought to control gas-appliance selling. I think a deal could be made between the gas company and the dealer so that they can work harmoniously. I have no special plan to suggest, because many have tried and many have failed; but I think the plan depends upon whether it is a small or a large company. In a large city it can be worked out much easier than in a small town. In the small town the gas company supplies gas to nearly every family: in a large city there are thousands of people who do not want to deal with the gas companies. Only recently are gas companies making themselves so popular that all of the people are willing to deal with them.

In Detroit they have an arrangement whereby the gas company charges from $2 to $2.50 more for a gas range than the dealer. If the consumer says: "How is this? Down the street I can get this range for so much less." The gas company says: "All right; go there and get it."

There is another side to it. If a manufacturer goes into a small town where the gas company handles certain ranges, they object to his selling to the dealer. They do not want any ranges in town except those they control. I think that every gas company should control the quality of the appliances for sale or distribution in its district, because they must look after them in case it needs attention.

J. P. HANLAN—We are in a different position from some of the gas companies because, in New Jersey, we have energetically pushed the sale of gas appliances for many years. The company I represent has spent money and energy to build up the business, which we think we are entitled to own and control. I advocate the gas companies controlling the sale of gas-burning appliances. The only kind of co-operation I believe in is competitive co-operation, whereby the dealer takes the business away from us by his own efforts, when he can approach the standard we have set in our territory. The gas company, as Mr. Crane says, is interested in an appliance from the day it is sold until it is worn out. That being the case, we are not only interested from the day the appliance is bought, but for many days before it is bought; many companies have co-operated with the manufacturer in designing appliances. Our company maintains a large selling organization, has a great number of show rooms, all of which means expense for the company, and we are legitimately and logically entitled to all that we can get honestly from the investment. For us to turn over any part of our business to the dealers would be folly. Most of our business of a co-operative nature is done through plumbers and contracting builders. We give plumbers a certain discount from our list selling prices, approximately the prices that he would have to pay if he bought direct from the manufacter. Builders we allow a discount of 5% or 10% from what the private customer gets.

Suppose, for argument, that we did not control the business. There are some people in the business for all they can get out of it; they don't care for the gas company or the consumer. With us there is some sentiment. We know that the interest of the consumer is inseparably linked with our interest. The plumber and the builder say: "Well, I am simply building this on speculation; I don't care whether the range gives satisfaction or not." Are we to allow that man to sell gas appliances? Should manufacturers of gas appliances be placed at the mercy of such men?

The dealer is another factor to be considered. There are no dealers who specialize on gas appliances. Even the largest stores in the cities do not have adequate displays of ranges and hot water heaters. We devote the same amount of space to display throughout the year. We are willing to co-operate with the dealer or plumber who will co-operate on a high plane; but we are going to control the business as long as we can and keep it on a high plane. If the other men want to do business on that basis, let them approach our standard.

(*Continued on page 10.*)

THE AMERICAN GAS LIGHT JOURNAL

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CHARLES H. WADELTON, Secretary and Manager.

SANFORD K. CAMPBELL, Editor.

NEW YORK, MONDAY, JULY 5, 1915.

Gas Quality and Performance.

Very often the value of certain research work is not thoroughly appreciated until some other line of examination calls it to mind. The article by Mr. Pierce, in which he describes the results of some experiments on the performance of the bunsen burner with gases of differing calorific values, gives a different aspect to a good many things we were just beginning to accept as standard. It emphasizes particularly the value of flame temperature in gas utilization, and shows, more forcibly than most others have done, that this characteristic is not always affected by an increase in B. T. U. value, the change being, of course, due to other constituents of the gas. Mr. Pierce's conclusion is a little startling when he says: "As far as incandescent lighting is concerned, it does not make the least difference to the consumer whether he pays $1 per thousand for gas of 480 B. T. U. or $1 a thousand for gas of 660 B. T. U."

From his data "it would appear that the incandescent gas lamp adjusted for maximum incandescence tends to be essentially a constant consumption, constant light output apparatus, independent of changes of gas quality, calorific value, specific gravity, etc."

We anticipate that his article will occasion some discussion.

Capitalizing Welfare Equipment.

The Massachusetts Board of Gas and Electric Light Commissioners, in a case of the Edison Electric Illuminating Company of Boston, have considered the question of allowing the capitalization of improvements that are not directly used in producing the utility's service. The most important of these is expenditures for "welfare" buildings and equipment, and the board held that their capitalization is of "doubtful propriety" if the sums expended go beyond providing reasonable provisions for health and safety of employees. While the influence of wide-spread movements such as the present one for workmen's improvement and comfort is likely to lead to overdoing in some directions, we see no liklihood of any body of company directors spending so much money for shower baths that the stockholders dividends will be endangered. Reasonable expenditures along these lines bring return in increased efficiency and productiveness of employees.

Summer Outing of New England Section, N. C. G. A.

The Fourth Annual Outing of the New England Section, National Commercial Gas Association, at Paragon Park, Nantasket Beach, on Saturday, June 26th, was attended by over 100 members.

Before dinner there was a series of sports, as follows:

Running Broad Jump, 8 Entries—Won by Hubert Standeven, Old Colony Gas Company; Arthur Bolwell, East Boston Gas Company, second.

Potato Race, 8 Entries—Won by J. Harrison Ward, East Boston Gas Company; Paul Egan, second.

Fifty-Yard Run, 12 Entries—Won by J. Harrison Ward, East Boston Gas Company; Hubert Standeven, Old Colony Gas Company, second.

Three-Legged Race, 4 Teams—Won by C. A. Burney, Earl Furtow, Old Colony Team; Paul Egan, Arthur Bolwell, East Boston Team, second.

The success of this outing was due to the following committees:

Outing—Edwin F. Ripley, chairman; Andrew F. Pettingell, Merle E. Abbott.

Reception—W. L. King, chairman; Henry E. Allen, John V. Peck.

Athletics—E. E. Orrell, chairman; Arthur J. Leary, William Hallett.

[Official Notice.]

Pacific Coast Gas Association.

Office of the Secretary, 445 Sutter Street,
San Francisco, June 29th, 1915.

To the Members of the Pacific Coast Gas Association.

Gentlemen: As the time is drawing near for the greatest gathering of gas men ever held, this is to advise you that all matters insofar as the local details are concerned are receiving attention at the hands of the Gas Congress Committee of your Association. As you have heretofore been informed, Mr. John A Britton, Chairman of the Gas Congress Committee of the Pacific Coast Association, appointed all Past Presidents to serve as members of this Committee, as well as the following named gentlemen: George C. Holberton, F. A. Cressey, Jr., George H. Collins, W. P. Hutchinson, C. B. Babcock, D. E. Keppelmann, Leon B. Jones, A. J. Halloran, R. J. Thompson. At a meeting of this Committee held on March 11th, 1915, the Chairman appointed the following to serve as Chairmen of the several Sub-Committees of the Gas Congress Committee:

Hotel and Transportation Committee	....	George C. Holberton.
Entertainment Committee	.....	C. B. Babcock.
Meetings	"	D. E. Keppelmann.
Information	"	Leon B. Jones.
Press	"	A. J. Halloran.
Ladies' Auxiliary	"	R. J. Thompson.

At a meeting of the Committee held on May 20th our President, Mr. E. C. Jones, who, as you all know, is also President of the American Gas Institute, reported most encouraging news as to the attendance of delegates upon this gathering who are members of the several gas associations throughout the world that will be affiliated with the Gas Congress.

When the proper time arrives you will be advised more in detail as to the arrangements which are being perfected by your Committee towards making the International Gas Congress an unparalleled success.

Make a note of the dates at this time—September 27th to October 3d. No member of the fraternity can afford to miss this great meeting, to say nothing of the Exposition.

In due time the Chairmen of the several Committees above named will no doubt make an appeal to our members to serve on their respective Committees, and this is to bespeak on their behalf the support of all members of the Association, for—as has been well and truly said—"In union there is strength," and we must have the co-ordination of all members of our Association if we are to make this great Congress the success that we all hope for.

Henry Bostwick, Secretary.

[OFFICIAL NOTICES.]

International Gas Congress.

The International Gas Congress which will be held in San Francisco, Cal., during the week September 27th to October 2d will be the most interesting and important event that has ever occurred in the gas industry, and on account of the great additional attraction of the Panama-Pacific Exposition will attract a large attendance of members of gas associations and others interested in gas matters from all parts of the country, creating a memorable event in gas history. The trip to the coast, always a valuable experience, will be greatly enhanced by the unusual feature of traveling on special trains occupied exclusively by gas people, and run under special arrangement with a view to securing the greatest possible scenic pleasure.

The Congress itself will be exceptionally attractive. Papers will be presented commensurate with the occasion, and participation by members of the gas fraternity from all sections of the United States, as well as from foreign countries, will make the occasion of historical importance.

The two leading features of the Exposition are its architecture and its illumination; the latter unique in its departure from former methods. Flood lighting takes the place of the old fashioned outlining of buildings, and the color scheme of the Exposition lends itself admirably to this form of lighting. Hundreds of powerful searchlights and thousands of electric bulbs, together with the gas lighting, spread a glow of light over the entire Exposition, amounting to over four billion candle power. This is probably the first Exposition where gas has come into its own. There are miles of high pressure gas lamps on ornamental posts.

The "Joy Zone" is illuminated by gas arcs concealed in ornamental lanterns; and in the Court of Abundance there are gas fountains with serpents hissing streams of high pressure gas. At night the effect is magical. No such lighting has ever been attempted before. Shaded lights are reflected on the sides of the buildings; searchlights shine constantly on statues and columns. The great Tower of Jewels, gray by day, is pure white in the rays of the searchlights; its columns are of the most exquisite turquoise green, and its jewels flash and gleam in the soft California breeze. Nowhere but in such a climate and under such a sky would this Exposition be possible. Gas is used from end to end of the Exposition for cooking and heating, and the service is everything that could be desired.

There is one curious thing about the San Francisco Exposition. You will find yourself visiting it several times before you begin to realize that you ought to be looking at the exhibits. Yet they completely exemplify the world's progress in the arts and sciences, and in extent and excellence take a place in the front rank of Expositions. For the first time in the writer's ken, beauty of color dominates beauty of form. There are great doorways which Michael Angelo might have planned, courts of marvelous beauty of proportion and detail. You almost weep to think that it is ephemeral, that in a year's time it will all be dissolved like the fabric of a dream.

In the Palace of Manufactures we have a Collective Gas Exhibit covering a floor space of 10,000 square feet, and enclosed in a beautiful pavilion, a comprehensive exhibit of every phase of manufacture, distribution and use of gas. The exhibit is so well lighted that it was necessary to have large glass signs hung stating that the exhibit is "Lighted by Gas." It was found that our electric friends were taking credit for the best example of interior illumination in the Exposition.

The expense of the trip to those using the special trains is: Railroad fare for the round trip New York to San Francisco $98.80; Chicago to San Francisco $62.50, on first-class trains with varying rates from intermediate points. Pullman fares New York to San Francisco, $18.00 each way for double lower berth; Chicago to San Francisco, $13.00 each way. As the special trains are run only one way, those going must, when buying their tickets, specify the route desired returning. The prices cover return by all routes except via Portland, and there is no additional charge on tickets if the return is via the San Diego Exposition. Returning via Portland and the Northern routes incurs an additional railroad fare of $17.50, and $4.50 Pullman to Portland. (See announcement of Master of Transportation.)

Hotel Accommodations.—Advance reservations will be taken up by the local committee of the Pacific Coast Gas Association, George C. Holberton, Chairman, 445 Sutter Street, San Francisco, Cal. The following hotels have been approved by the Committee, selected owing to favorable location:

Bellevue.—Room with bath, one person, $4 to $6; two persons, $5 to $7; American plan, add $2 a person.

Clift.—Rooms with bath, one person, $2.50 to $4.00; two persons, $4 to $6; American plan, add $2.50 a person.

Fairmont.—Rooms, with bath, one person, $4 to $7; two persons, $7 to $10.

Palace.—Room, without bath, one person, $2 to $2.50; two persons, $3.50 to $4; room with bath, one person, $3 to $7; two persons, $5 to $10.

Plaza.—Room without bath, one person, $1.50 to $3; two persons, $2.50 to $4.50; room with bath, one person, $2 to $6; two persons, $3.50 to $7; American plan, add $2 a person.

Stewart.—Room without bath, one person, $2 to $3; two persons, $3.50 to $4. Room with bath, one person, $2.50 to $4; two persons, $4 to $6. American plan, add $2 a person.

St. Francis.—Room without bath, one person, $2 to $4; two persons, $3.50 to $7. Room with bath, one person, $3 to $6; two persons, $5 to $10.

Membership Fee.—All gas men, whether they attend or not, can become members of the Gas Congress upon payment of five dollars ($5), which will entitle them to attend the sessions of the Congress and to receive a copy of the Proceedings when published. This fee is necessary to cover the expenses of the Congress and publishing the Proceedings; and will have to be paid in advance in order to determine the size of the edition of the Proceedings, as it is not expected to provide a surplus, but to print only copies enough to supply the paid subscriptions.

The concensus of opinion, shown by interviews and correspondence with members who have already visited the Exposition, is that no one will reget the expense incurred and will feel amply repaid for any sacrifice made. It is, therefore, up to the gas fraternity to show its faith in the future of our industry by a creditable attendance.

"There is every reason why the gas men of the world should go to the Gas Congress and the Pacific Coast, and there is no reason why they should not."

INTERNATIONAL GAS CONGRESS,
GEO. G. RAMSDELL, Secretary.

ANNOUNCEMENT.—MASTER OF TRANSPORTATION.

Following the usual custom, and in order to accommodate members of gas organizations, their families and friends who desire to attend the International Gas Congress in San Francisco in September, the Transportation Committee announces that special trains will be run from New York and Chicago.

The committee has the assurance of the railroad companies that the trains will be the handsomest ever assembled, and will include baggage car, buffet-club car, standard drawing-room and compartment sleepers, dining cars and observation car.

Special attention has been given to the routing of the trains, so that the delegates will receive the maximum scenery and travel comfort in a minimum amount of time. The route selected is the Pennsylvania Lines to Chicago; Chicago, Burlington & Quincy Railroad, Chicago to Denver; Denver & Rio Grande Railroad, Denver to Salt Lake City; and Western Pacific Railway, Salt Lake City to San Francisco. The schedule of the trains has been so arranged that they go through the scenic points of interest and the heart of the Rockies in daylight, and short stopovers at points of interest en route will entirely banish the weariness associated with a protracted journey. The scenery along the route includes some of the most noted natural wonders of the world. The trains will be under the escort of an experienced railroad representative, who will accompany the party during the entire trip.

The Transportation Committee will shortly issue a booklet giving full details in regard to the trains, schedule, points of stopover, rates, etc., in which will be included a postcard for making reservations, and it is especially requested that those who contemplate using the special trains will fill in and mail this card, designating reservation desired, immediately upon its receipt, thereby assisting the Transportation Committee in completing details with the railroad companies.

B. J. KELLUM,
Washington Blvd. and Des Plaines St., Chicago, Ills.

Canadian Gas Association.

OFFICE OF THE SECRETARY-TREASURER,
HAMILTON, ONT., May 28, 1915.

At a recent meeting of the Executive Committee of the Canadian Gas Association held in Montreal, it was definitely decided that the next annual convention of the Association will be held in Montreal on Thursday and Friday, September 16th and 17th, 1915.

J. KEILLOR, Secretary-Treasurer.

(*Continued from page 7.*)

Relations Between Gas Companies and Dealers.

The average plumber is not a salesman; his training is along mechanical lines. They do not solicit any business in our line. I have talked with lots of plumbers and they say, "Well, business is so cut up that I don't go after it. I make all the money I can out of jobbing." There are few plumbers that specialize on new work; most of them have to rely on the business that comes to them. If we go into this competition of gas-burning versus other-fuel-burning appliances, the men who have the most at stake will get the most out of it. Thé gas company has got the most, and therefore they are the ones to be considered. We have a little competition now, but it does not amount to much because they do not care anything about quality and will put in any old thing. No man, and no body of men, no matter how good their wares, can get all of the business; so we will have to be content with taking as much as we can legitimately. We would like to get a little more of it, to be sure; but we cannot get it all.

Therefore, to question No. 1: I would answer most emphatically that I do not believe in it, and I do not think we will ever do it. Mr. Eves has covered the second item, and I will not add anything to his remarks. As to the third item; on an instalment basis, I think they can. They cannot compete on any other basis, if they give the service that the gas company does. The fourth is a double question. If it is a good appliance I do not think any objection could be made. In fact, I think I would be willing on high grade appliances to go the limit with the dealer who wanted our assistance in any way.

EMIL KORTHAUS.—In answer to the first question—I say no. If the gas companies turn over the sale of gas appliances to the dealers it would have a tendency to lower the quality and increase prices. It is to the best interests of the gas companies to see that only the best appliances are sold, and to this end they should co-operate continually with the manufacturers of appliances and the dealers, but not turn the sale of gas appliances over to the dealer entirely.

To the second question, I would say that only gas burning appliances and articles that have an immediate bearing on the efficient operation of certain gas burning appliances, such as mantles, glassware, toasters, griddles, etc., should be sold.

The third item can be answered both in the negative and affirmative. Dealers can compete with gas companies provided gas companies do not undersell them. On the other hand, it is very easy for a gas company to undersell a dealer if the management so decide, because gas companies do not depend on the profit from the sale of appliances.

To the fourth question I would say yes—dealers should be co-operated with. If it is the policy of the company, as it is with most, to connect gas appliances free up to a certain number of feet of pipe, the same courtesy should be extended to dealers who sell appliances of standard make, even if such appliances are not sold by the company.

The fifth question is one for discussion. It could possible be accomplished by the refusal of gas companies to connect gas appliances that have not been approved by the gas fraternity. This might make dealers sell only such appliances as the gas companies would connect for their consumers.

WILL W. BARNES.—I take very much the same stand as Mr. Roper. In my field of effort, I can say without any hesitancy that the plumber has not done the gas lighting business any good. If we, as manufacturers, depended on the plumber to sell fixtures, we would not be in business. The fixture manufacturer to-day is aiming to elevate the product; to build an appliance that is not only ornamental, but efficient. Let such fixtures be placed in your show rooms, and in only a few months the fixture dealer in your town will endeavor to duplicate them in appearance—and in appearance only. I sometimes wonder if the average fixture dealer has a conscience. Some of the fixtures placed in our homes to-day are a disgrace to the makers of them. It would be an unfortunate thing for us, as manufacturers of gas lighting appliances, to be dependent on dealers.

I followed Mr. Eves's remarks rather closely. He lives in a city decidedly different from the average locality. In New Haven there is an unusual friendly feeling between the dealer and the gas company. The New Haven Gas Light Co. has on display lighting fixtures loaned to them by a number of dealers, and if a sale is made of any particular fixture, the dealer who placed that sample in the showroom gets the order. It is a good thing for the New Haven Gas Light Company, because they have the co-operation of the dealer: but we do not find many cities where there is that same friendly feeling. I know of another city in New England where the feeling is entirely different. There the dealers, instead of giving friendly co-operation to the gas company, indulge in the most strenuous knocking against everything the gas company sells. In fact they are so antagonistic that they would prefer not to pipe a house for gas, and in that town the gas company is making the fight alone. I believe the N. C. G. A. is on the right track, and I know the past few years have been productive of much good in elevating the character of the product the gas companies offer to their consumers. It all tends to that one thing that we are aiming to give, good service.

I think it would be suicidal for the gas fraternity to discontinue the sale of gas appliances of any kind.

PHILMER EVES—The feeling friendly in New Haven between the gas company and the dealer has been brought about mainly by co-operation. One way by which we try to co-operate is in giving them advertising service in the form of small display cards, which they place on the walls and in their windows, attracting the public's attention to gas fixtures. These cards are 13 inches long by 6½ inches wide; cost very little, and are very showy. The word "Gas" is large and is placed in the panel at the corner of each one. The first bears the words "Modern Lighting," and "Is Your House Piped?" If we can interest the public, we can sell the fixtures; and the dealer is, therefore, willing to install the card. Another card has on it "A Good Mantle Saves Gas." He is willing to put that in his window, because it enables him to sell the incandescent light. Therefore, it is co-operative service.

C. E. ROBERTSON—It seems we are all pretty much of the same mind in regard to selling appliances. The point that I want to bring out is this—why cannot we continue to sell appliances and make a profit instead of selling them at a loss? Last year we sold $500,000 worth of appliances, and the attention of the Chairman of our Board was called to the fact, and he wanted to know how much we had made out of it. We had to tell him that we had made nothing. He said that we ought to take steps to get a profit out of that very substantial part of our business, because our gross sales only amounted to about $3,000,000 for gas. I submit this point for you to think over.

H. H. NEWMAN—Most all here have said their companies control gas appliances, and probably as far as gas ranges and water heaters are concerned that is so; but we are passing over one of the most important parts—lighting fixtures. I believe no single item has caused as much criticism of gas companies as the fact that so many poor lighting fixtures and poor lamps are sold, and as a matter of fact, the gas company has nothing to do with it. A consumer complains of poor gas when it is not the gas at all, but the lighting fixture he uses that causes the trouble. There are any number of lamps sold for 30 cents that, with good care, will last perhaps almost 30 days. A careful study of lighting conditions would, I think, correct this. This is an important part of our business, and we have let it go by the board in an endeavor to sell ranges and water heaters and fuel appliances. Few companies have any control of the lighting fixtures and lamps. The dealers, the 10-cent storekeepers and the fixture men, and once in a while a plumber, control this branch of the business, and we should give more attention to it.

GEORGE HARRIS—Opinion appears to be one-sided, and I must only acquiesce; gas companies must not go out of this business. I would put it in these words: As far as possible, never allow a third party to come between you and your customer. I would like to dwell a little more strongly than the other speakers on the dealer and co-operation. We must recognize that the dealer is here, and we ask ourselves, "What are we going to do with him?" The Good Book says, "The poor ye always have with you." This is also true in the commercial field. The manufacturer of poor, undesirable appliances we have with us always. He comes to you, and you do not give him a second look because you recognize the quality and the undesirability of his appliances; but he is manufacturing those undesirable appliances, and selling them; he sells to the dealer in your town. Would it not be desirable to co-operate with that dealer—to offer to him such an inducement as will make him work with you to discourage the sale of undesirable appliances and to handle appliances approved by gas men?

Now, I would like to touch on the educational question that the Association is interested in. Assuming that you may in the future co-operate with the dealers to a certain extent, if you are not now doing so, let each gas company that has an educational class for its employees, holding monthly or bi-monthly meetings, invite the dealer and his clerk to get the benefit of the information given to your employees. Thus he will become a more intelligent handler

of our appliances. You have, for instance, a speaker to give an illustrated lecture on water heating. That is of sufficient interest to bring in the dealer and even the plumbers. Send out circulars, or invite them personally.

W. H. GARDINER—The last speaker has touched upon one of the vital points with relation to whether a gas company in the small town should co-operate with the dealers and the plumbers. I have always held it as a general principle, as bringing about an ideal situation, to get as many people as possible working under your control. In this way actions antagonistic to established interests are avoided.

Mr. Crane spoke of the situation in Detroit. Perhaps the fact that the gas company sells gas appliances at a higher price than the dealers is a special stimulus by means of which the gas company is endeavoring to get the dealers selling gas appliances under its control. It is an evolution of the idea of the self-supporting commercial department. We used to think that the way to sell things was to make the price low; but of late we see that the nearer people get things for nothing the less they think of them. And I have thought that if, instead of selling a gas stove for $13, we sold it for $17, and put a considerable fraction of the extra $4 into better salesmanship—salesmanship which not only sold the gas stove, but sold the gas company, in advertising terms, to the customer, and made him a friend of the company, would be a better sale, a more enduring sale, than the lower priced article.

The self-supporting appliance department is the proper thing. The only reason we are in the appliance business is to give our communities the maximum usable service we are purveying. I think we should do this through as broad channels as possible under our control.

THE PRESIDENT—Is there anybody here from Chicago who can give us an idea of their prices and the profit that they make on appliances? Mr. Roper, can you tell us?

GEO. D. ROPER—I cannot say what profit they make. I do know, however, that they had a campaign selling gas ranges for $28.50 or $27.75, the same range that we sold in Philadelphia for $22.

THE PRESIDENT—I do not think the price in Chicago has made any difference. My recollection is that for the last three or four years they have increased the prices of appliances every year, until they have now gotten into a position to make enough money to take care of their new business department, advertising and all.

W. H. GARRISON—I have heard gas companies say that the burden is so heavy in selling appliances that they thought it had better be turned over to a dealer. I do not know of any case, however, where it has been done without the sale of appliances falling off at least 75%. In some cases I know of, the sale practically stopped. The question is whether the gas company is ready to have the sale of appliances dropped in their town—whether they can afford to do that. It is like a gum manufacturer that I heard of some years ago out in Ohio. He was spending $100,000 a year in advertising his product, and thought he would save that money. The first year he saved the $100,000, but his sales showed quite a loss. The second year he decided to start advertising again, but his sales still fell off, owing to the effects of the lack of advertising during the previous year. It took him some years to get the sales back to what they were originally. He found that he could not afford to stop his advertising.

GEORGE D. ROPER—I know of no better illustration than St. Louis. A few years ago the new management placed gas stoves on sale in all the large department stores and hardware stores. During the three months April, May and June, they had the exclusive sale. Then John C. D. Clark went to St. Louis, and the gas company allowed him to start in July—because, in a ride around the city, he could not find any gas stoves on sale, or they were so covered up with other things that they could not be seen or shown—and during July, August and September he sold more than double the number the dealers had sold during what we call the cream months. In other words, if dealers are going to sell gas stoves, they will do it only when people ask to see them.

The gentleman from Passaic told you what condition you would be in if you let the dealers handle the gas stoves exclusively. What he told you about lighting appliances and 10-cent mantles is also true.

RECIPROCAL LIABILITY INSURANCE for public utility companies is being furnished by the Utilities Indemnity Exchange, of St. Louis, Mo., with a reported reduction of 40% in the cost to member companies. The members deposit each month sums about equal to the rates of stock companies, and out of the funds thus accumulated the losses and running expenses are paid. At the end of each year the unexpended sums are returned to the members.

The Prepayment Meter in the South.

[From a Paper by M. A. BOWLIN, Read Before the Southern Gas Association.]

When I started writing this paper I attempted to divide it into four parts, *i. e.*, "The Advantages and Disadvantages of the Use of the Prepayment Meter to the Consumer; and The Advantages and Disadvantages of the Use of the Prepayment Meter to the Gas Company." I found, however, that the advantages and disadvantages to consumer and company are so closely associated that they can not be clearly separated. I have, therefore, made no distinct divisions, but present both as I find them.

The majority of gas consumers are paid weekly. It is much easier for the weekly wage-earner to pay for gas a quarter at a time through a prepayment meter than to pay an entire month's bill out of one week's wages. By paying for gas this way the consumer has a better check on the quantity of gas that is being used, and naturally will try to make each quarter last as long as possible. He will thus be more economical in the use of gas. It's not what is used that costs so much, it is the gas wasted. At first glance this economy feature would seem to work to the disadvantage of the company; but how many companies would rather have high bills with frequent complaints, than reasonable bills with everybody satisfied? Figuring the extra cost of investigation of "high bill" complaints, etc., isn't this economy advantageous to the company as well as to the consumer?

As we all know the extravagant colored cook is the bane of the gas man's existence. If we could educate the colored cook to use gas economically, just look at the number of all-gas-kitchens we could get. By having the cook come to her mistress every time the meter needs a quarter the attention of both cook and the mistress is called to the tact that gas is being consumed, and in the mind of the cook there is created the desire to make the quarter last as long as possible. The prepayment meter puts a check on the waste of the colored cook, helping the consumer to use gas economically, and the gas company to retain the installation.

The consumer is saved the time and trouble of coming to the gas office to pay the monthly bill. In many cases this doesn't mean much as he is down town every day, yet it is one less bill to attend to. Many consumers who are perfectly honest and prompt in meeting their household expenses object to tieing up $5 or $10 with the gas company, when by installing a prepayment meter no deposit is required. In case of a newly married couple or one just going to housekeeping this is appreciated.

One disadvantage of the use of the prepayment meter by the consumer is that a perfect 25 cent coin must be used in order to get gas. In outlying districts this is sometimes inconvenient. In many homes this contingency is guarded against by having a supply of quarters always on hand. Some of our consumers give our meter readers a check for the amount of money taken out of the meter, the quarters being turned back to the consumer and used over again.

In Jacksonville very few houses have basements or cellars and in many cases the standard meter is set under the porch or the front of the house. If the consumer desires a prepayment meter, extra piping has to be run, the expense of which is borne by the consumer. In cities where every house has a cellar it is just as easy to place a prepayment meter as a standard, the only disadvantage to the consumer being the running up and down stairs. We require that prepayment meters be installed in the house in a protected place where there is the least chance of robbery, and always require the consumer to reimburse the company for any money stolen and for repairs to the meter.

Unless a hard and fast rule is followed requiring a heavy deposit from all consumers irrespective of their commercial standing, the use of the prepayment meter is advantageous to the company in that there is no loss by consumer not paying bills. True, you may have a deposit to cover the estimated bill, the average being about $5.00 for residence use; but, suppose the consumer burns $5.00 worth of gas in the month. You render him a bill on the first for the gas used up to about the 25th. He has ten or fifteen days to pay for it before the period of discount expires. If he fails to pay the bill, you send a shut-off notice giving him two days to settle. At the expiration of this period you send out, cut off his gas and bring in the meter. How are you going to collect for the gas consumed from the time the meter was last read until it was taken out? Your deposit won't cover it. You've lost your gas and your consumer too. Wouldn't it be better to install a prepayment meter, get paid for the gas and retain a customer?

In the company with which I was connected in the north, we used the prepayment meter to collect delinquent bills, both gas and merchandise. Where a consumer became delinquent, instead of cutting off the gas and bringing in the meter, we would suggest putting in a prepayment meter set to sell gas at 15 cents to 25 cents above the regular rate, the difference over the regular rate being credited to the delinquent account. The consumer continued to use gas and at the same time reduced his indebtedness. In the majority of cases the consumer was glad to accept this means of settlement, and we were paid in full and also retained the consumer. After the indebtedness was paid we would change the meter to the regular rate, or set a standard meter with an increased deposit. Most of these consumers, however, retained the prepayment meter and we were thus protected against further delinquencies. For collecting old accounts the prepayment meter is decidedly advantageous to a gas company. It may involve a little extra bookkeeping, but the results will more than offset the slight trouble in keeping these accounts.

In every city there is a class of people whose credit is bad. There are also many people who cannot afford to tie up a $5.00 deposit but who can afford to pay for gas in 25 cent lots. Chinese laundries and Greek fruit stands, for instance, are usually good consumers, but it is mighty hard to make them understand why they should deposit $10.00 or $15.00 with the gas company. In these cases the prepayment meter is an easy solution.

In handling office accounts of prepayment meter consumers labor is reduced to a minimum. The only bookkeeping necessary is the entering of the reading and the amount of money taken from the meter. This means a considerable reduction of overhead expense. Where prepayment meters are used a great saving in stationery and postage is made. Where bills are made out each month a direct saving of 24 cents per year per consumer is made in stamps alone, besides the cost of envelopes and bills, and time making out, checking and entering bills. Where bills are delivered the cost of delivery is saved. There are no delinquents with the prepayment meter and collection expense is eliminated. The bookkeeping, stationery and postage expense of notifying delinquent consumers, and the trouble, dissatisfaction and extra labor of the actual cut-off and bringing in of meter, meter room expense and loss of consumer are all avoided.

There are also fewer complaints of high bills from the prepayment consumer. As stated before, the prepayment meter gives the consumer a check on the gas used. When extra cooking is being done or when carelessness or waste occurs, the increase is immediately brought to the consumer's attention and he knows right then what is causing him to use more gas than usual. These increases in gas used are often forgotten by the end of the month, and when an unusual monthly bill is rendered the only thing the consumer does is to condemn the gas company and rush to the office with a complaint. You all know the story. The meter is investigated, found O. K., but there always remains a doubt in the consumer's mind as to whether you are on the "square" or not. He is convinced in his own mind that the gas was *not* used, and you cannot disabuse his mind of that conviction.

Then there is the consumer whose bill is higher than he thinks it should be. As we cannot render him an itemized statement of gas used, as can the grocer or meat market, the next thing in order to satisfy him and retain him as a consumer is to recommend the installation of the prepayment meter, so he can check the daily consumption. There is also the case of the consumer of a suspicious nature who wants to see just exactly how much he is using and not depend on the accuracy of the meter-reader or bookkeeper to render a correct bill.

With new consumers, especially when selling appliances, the fact that there is no deposit required on prepayment meters works to the advantage of the company and creates a favorable impression right at the start. Where the parties have never used gas before, and a standard meter is installed, the chances are that the first month's bill will put a "damper" on their ardor for gas. Being new to gas there is a chance for a lot of waste; with the prepayment meter installed, any waste or excessive use is immediately detected. Personally, I always recommend the prepayment meter to new consumers. I have found that it is the quickest and best way to cement the friendship just established between the consumer and gas company.

In Jacksonville we have what we call a Special Rental Range Plan to introduce gas in colored households and to familiarize colored cooks with the use of gas. We install a prepayment meter and range absolutely free in certain picked houses and localities, the meter originally set to sell gas at 15 cents per 1,000 feet higher than the regular rate, the difference being credited as rental for the use of the range. The plan has now been extended to include whites as well as colored people. The regular price of gas has been reduced several times since then, but the Special Rental Rate has remained the same, and now there is a difference of 40 cents per thousand between gas sold on the Special Rental Meters, as we call them, and our regular meter. We have now over 1,000 of these ranges out. The original investment in the ranges themselves has been paid, and we are receiving a regular increasing revenue from those meters, in addition to the actual gas sold, of several hundred dollars a month. Not only has it proved one of our best paying investments, but it has been the means of educating the colored cooks to use gas and use it fairly economically. These results could only have been accomplished by the use of the prepayment meter.

Opponents of the prepayment meter raise the question of the increased cost. This does, of course, add quite a sum to the meter investment, and is one of the most common objections to their use.

The robbery of prepayment meters apparently looms large in the eyes of some gas company officials, and is a frequent argument against their use. It depends greatly on local conditions, the location of the meters, and the class of the people in the town, whether or not the robberies are frequent enough, or the amount taken is large enough to be a real objection. Of course it is annoying to have frequent robberies, and as each case is brought to the attention of the head of the office the prepayment meter robber is kept in mind and is the first thing that "pops" into that official's head when the subject of meters is brought up. But, is the total amount actually lost by robbery anywhere near that lost by failure of consumers to pay their bills even though they have a deposit? Don't you have to send a man out to collect the bill, failing which he shuts off the gas and brings in the meter? How much money is lost by your company by people moving out of town and failing to pay their bills? How much do you charge off at the end of each year as "Uncollected Bills"? And how much do you actually lose by prepayment robbery? I venture to say that if actual figures are compiled the balance will be very much in favor of the prepayment meter.

In cases where the parties are living in the house and the meter is broken open, it is comparatively easy to collect. In Jacksonville we require the consumer to stand the loss of money, and in most cases repairs to the meter. We take the position that the prepayment device is for the accommodation of the consumer, and that we cannot be responsible for money deposited any more than the grocer would be responsible for money left in a box for groceries delivered. We have been bothered considerable lately by robbers and have found them very hard to catch; but when we do catch one we push the case vigorously, and have a number of convictions to our credit. We have had cases where they have disconnected and stolen the meter, and one case where the robber was asphyxiated by punching a hole in the meter in his attempt to get into money box. Most of the stealing is by young negro boys, generally working in threes. Two stay on the outside apparently playing, or across the street where they can watch and give a signal, and the third goes around the rear to the meter. We have broken up several of these gangs and are constantly on the watch. We have a standing reward of $25 for the arrest and conviction of a meter robber, and every meter set has a notice to that effect pasted on it. We have also notified the police and detective departments, and they are active in assisting us to capture and prosecute. We have had very few failures to convict.

One big disadvantage to the use of the prepayment meter is the apparent lack of close touch between the company and consumer by his not having to come to the office to pay his bill. If we could get every consumer to come to the office once a month, we could show new uses for gas and maybe sell new appliances. But do you think it a good thing to approach a consumer when he is spending money, with perhaps a doubt in his mind that he used the amount of gas as stated on the bill? Isn't it likely, and doesn't it happen that if you approach him just after he has parted with his cash, his remark is apt to be to the effect that the gas company is getting too much of his cash now and he can't stand any more? Then again, on the last day of discount, there is generally a large crowd. There are always some who wait until they pay their bill to kick, and isn't it discouraging, for instance, when you have almost closed the sale for an automatic water heater to hear another consumer telling how much gas her water heater used last month, and "isn't it simply outrageous?"

Some may say that a good method of distributing advertising through the medium of gas bill enclosures, stickers, etc., is lost by the use of the prepayment meter. In Jacksonville we have our meter readers carry such advertising matter with them and leave

it at the houses. Many times he can give it to the person directly interested.

Our use of the prepayment meter is not confined to persons with bad credit, foreigners and negroes, a large number of our best homes have them. Many of our automatic water heater users have a prepayment meter on their range. We have been enabled to place gas ranges and all-gas-kitchens in the homes of the wealthier residents only by using the prepayment meter.

In connection with this subject, I wrote a number of gas companies in the South asking for information, and found the percentage of prepayment meters ran as high as 75%. In only two companies was a deposit required on prepayment meters, and one of these explained that the deposit was due to a peculiar local condition. The other company was discouraging their use and had made the deposit twice that of the standard meter. Very little trouble was reported from robberies, and in the majority of cases the consumer was required to make good the loss. There were very few convictions of robbers. Punishment, if any, ran from a small fine to 6 months on the county road. One company had only one conviction, and the guilty party pleaded insanity and was sent to an asylum.

One general complaint was shortage of money in the box due to failure of mechanism to shut of at the proper time. This shortage, however, in most cases was collected from the consumer. In this connection I notice an article in the AMERICAN GAS LIGHT JOURNAL to the effect that the New York State Commission of the Second District has decided that it has no authority to prevent a company cutting off consumers who refused to pay for shortage on a prepayment meter. An interesting point brought up was that the meter is so built that it shuts off only when ten or multiples of ten cubic feet of gas have been used, i, e., if the rate is $1.20 per 1,000, every 25-cent piece is supposed to deliver 208⅓ cubic feet of gas, whereas the meter did not shut off until 210 had been used, thus in the course of time accumulating a shortage. In this particular case the consumer refused to pay the shortage and appealed to the Commission when the company threatened to cut off gas for nonpayment. The commission upheld the company and the clause in the contract providing for payment for gas used in excess of that paid for in the meter.

Referring to the meter shutting off at ten or multiples of ten cubic feet, we tested a number of our meters and found a difference of only a fraction of a cubic foot in the amount delivered and the amount supposed to be delivered for a quarter, too little to he taken into consideration, and practically no loss occurring in a thousand feet.

In taking up the subject of prepayment meters, almost the first thing that occurred to me was "How does the prepayment meter affect new business?" In checking over the results of our efforts in Jacksonville, I am convinced that we have gotten by it at least 30% new business not otherwise obtainable, and that if we should abandon the use of the prepayment meter we would immediately lose from 1,500 to 2,000 good consumers.

The use of the prepayment meter leads to economy on the part of the consumer, and I believe that it is good business to provide every possible facility for him to use gas economically. The economical use of gas means more consumers, more appliances sold both to old and new customers, and, best of all, more boosters and friends for the gas company; that essential and much longed for thing, Good Will.

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 20 cents.

1,142,524. Gas Producer. N. Latta, Milwaukee, Wis., assignor, by mesne assignments, to Allis-Chalmers Mfg. Co.

1,142,594. Burner for Inverted Incandescent Gas Lamps. H. Lyon, Gloucester City, N. J., assignor to Welsbach Light Co., same place.

1,142,603. Gas Stove Attachment. P. Moellendick, New York City.

1,142,608. Mechanism for Lighting and Extinguishing Street Lamps. S. Newbold, Baltimore, Md.

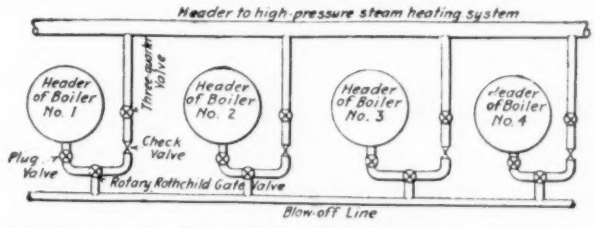
1,142,633. Gas Producer. P. C. Schmidt, Olympia, Wash.

1,142,676. Positive Automatic Gas Safety Valve and Control. W. A. Davenport, Scranton, Pa., assignor of one-half to C. S. Davies, same place.

1,142,779. Gas Saving Appliance. A. R. Umbarger, Walton, Ind., assignor of one-half to A. A. Tritt, same place.

New Methods and Appliances.

STEAM-HEATED BOILERS AID TO QUICK FIRING.—Two generating stations of the Dayton (Ohio) Power and Light Company situated not far from each other are operated in parallel, and occasions arise when it is necessary to shift the majority of the load quickly from one plant to the other. At such times batteries of boilers must be brought into action quickly, and to get speed in firing and at the same time to operate the station economically, a scheme for quick firing has been worked out which provides principally for a steam-piping system arranged to keep the boilers hot without fire on the grates. Steam for this purpose is taken from a header which feeds the high-pressure heating system, the pressure on this line being about 125 pounds.



In a boiler connected as shown in the accompanying sketch, the water is maintained at its normal level and the temperature kept at about 210° Fahr. The grates are covered with a fuel bed of oily rags, kindling and coal, and it is generally possible to get the boiler fired and on to the line in from 3 minutes to 5 minutes. In 15 minutes from the time the fire is lighted such a boiler will be receiving its full supply of coal through the stokers and delivering its full-load rating. Without some sort of quick-firing arrangement a boiler, it is said, can hardly be made to dellver its full load in less than 45 minutes from the time it is fired.

TIME STUDY ON EXCAVATING AND HANDLING MATERIAL.—There are few hard-and-fast rules by which a manager can be guided in handling men on construction work, but the accompanying table may in some measure indicate what may be expected of a workman under average conditions. The data in this table were compiled from a study of the construction of a steam-heating line for the Merchants' Heat and Light Company at Indianapolis, Ind.

Results af a Time Study on Steam-Main Construction.

Operation.	Units per Man-Hour		
	Maximum.	Minimum.	Average.
Removing asphalt; square yards	1.60	1.29	1.45
Bemoving brick pavement; square yards	3.00	1.25	1.87
Removing concrete (both hard and soft); square yards	3.36	0.57	1.79
Excavating and wheeling; cubic yard*	0.55	0.25	0.40
Laying 12-inch pipe; feet	1.25	0.33	0.8
Setting plates and rollers; pair	1.5	1.0	1.25
Covering 12-inch pipe: feet	15.5	5.3	7.6
Laying 18-inch tile; feet	5.25	0.55	2.9
Back-filling; cubic yards	0.44	0.16	0.3
Concreting; square yard	0.6	0.3	0.42
Sheeting; foot	1.5	1.0	1.25
Pulling sheeting; foot	6.12	4.45	5.0
Laying brick; square yards	0.89	0.31	0.62
Loading wagons; cubic yards	2.57	1.03	1.82

*Note.—Considerable wheeling of materials was required in alley construction

HYDROMETERS FOR GAS LIQUOR.—The Charlottenburg Institute has been investigating as to how far hydrometers are of service in determining the ammonia in gas liquor. Other gases in solution were found to make the readings different even where the true specific gravities of the liquor were the same. Chemical reactions also interfere with the readings. On the whole, instruments of the hydrometer class do not show the percentage of ammonia present, but for rough working purposes as at the scrubbers, they give valuable comparative indications.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE Hyde Park Gas Company, Scranton, Pa., advertised for Saturday, June 26th, a special sale of gas irons at $1.25 each, including tubing. The sale was to begin at 8 a. m., and 500 irons were to be sold in 500 minutes. We have not heard how long the supply lasted, but remember that when General Superintendent E. M. Stack had a similar sale of mantle lamps last year the number provided disappeared long before the time limit expired.

M. L. HIBBARD, General Manager of the Union Light, Heat and Power Company, Fargo, N. D., has been elected a member of the House Committee of the Fargo Commercial Club.

ARTICLES of incorporation have been filed in Dover, Del., for a company designated as "Surface Combustion, Incorporated, New York," with authorized capital of $2,000,000, to develop processes and appliances for burning gaseous and liquid fuels. Those named in the application are Hugo Leeber, Eugene Beecher, Arthur W. Beves, Frank A. McGurk, William W. Goocle, James B. Mackee, all of New York City, and Edgar Park, Larchins, New York.

IN its gas-cooking campaign the Plymouth (Mass.) Gas Light Company had a big banner stretched across Main street telling of the demonstrations that were being held at different places around the town. This method of acquainting housekeepers with the good points of a gas range as a kitchen asset has found favor with Plymouth housewives. Miss Carolyn P. Webber, of Boston, expert in domestic science, showed them how the terrors of cooking in a hot kitchen during the summer months are elimated. Friday afternoon the demonstration was given in the store in Magonis block, 305 Court street. Friday evening, in the same place, the demonstration was in Italian for Italian consumers.

IN advertising gas lighting the Atlantic City (N. J.) Gas Company uses this heading:

"*Safety First.*"

"Gas has proven Reliable and Safe for illumination. For the last six years not one fire has been caused directly by gas in Atlantic City."

W. F. DOELKER, new Business Manager for the Concordia (Kan.) Gas Company, says that for the month of May and June the business of the company has increased 50% over last year. The increase in the use of gas is around 32%, and even during the recent flood the company kept its service up to the usual high standard. Mr. Doelker says that the people of Concordia are buying only the better class of gas ranges, but are only beginning to realize the advantages of the gas water heater, and the company is doing an exceptional business in these lines.

THE exhibit of the American Meter Company at the Panama-Pacific International Exposition has been awarded the grand prize. In addition to what they show in their own booth, apparatus made by them constitutes quite a large part of the exhibit of the United States Bureau of Standards.

A SPRINGFIELD (Mass.) paper says the extensive new gas-making apparatus of the Springfield Gas Company is now in full operation, and the old 24-hour bank has been shut down. It has taken all the spring to get the new retorts in use, but the last one was swung into service May 15th. Under the new method, 1,500,000 cubic feet of gas can be made each day.

THE architects plans and drawings are completed for the structure involving a cost of approximately $1,000,000 for the Municipal Gas Company, at 124 and 126 State street, Albany, N. Y. The directors of the company are not agreed as yet as to how many stories will be constructed, but there is every likelihood that a 10 or 12 story office building will be put up. At present, part of the bookkeeping of the gas and electric companies is done in two offices; the consumers' accounts are kept in the office on Trinity place, while the general books are kept in the building on State street. When the new building is completed the offices will be amalgamated. A further advantage of the new building will be the display rooms and windows possible with the extensive front at 124 and 126 State street. The company, as does most gas companies, retails a vast number of gas and electric appliances, and it is proposed to exhibit these in a way that will boost sales. The building will be an ornament to the city.

MR. BURTON SMART, treasurer of the Portland (Me.) Gas Light Company, says as to the reason for the recent reduction in the price of gas to large quantity users: "It means that we are going to give Portland manufacturing concerns a boost, in furnishing them with the best and most economical light, fuel and power at the lowest possible price, and the more a customer uses the less per cubic foot he pays for his gas. It means that we have put the price at a point where industrial concerns of all kinds can save money by using gas for light, heat and power. As stated in our advertisement, this reduction is of special interest to laundries, bakeries, restaurants, canning factories, stores, foundries, hotels, candy manufacturers, gas engine users and industrial and commercial concerns of all kinds. Much has been said about booming Portland and its industries. This action should go a long way in that direction."

WHETHER the Des Moines (Iowa) Gas Company will submit without further appeal to the refunding of $115,000 to local patrons or will ask for a rehearing of its case before the Supreme Cout of the United States depends, it is said, upon the conclusion arrived at by Jansen Haines, president of the company, and his chief attorney, Judge George H. Carr, when they shall have finished reviewing a copy of the opinion that upheld the 90-cent gas ordinance. Many persons believe a rehearing will be asked for. Others are of the opinion that the refund will be paid as soon as matters can be adjusted.

THE Pacific Gas and Electric Company has been awarded a Medal of Honor by the superior jury of the Panama-Pacific Exposition for its welded high-pressure gas main svstem, which supplies the exposition with gas. The system consists of eight miles of steel mains, 8-inch, 6-inch and 4-inch, distributed about the Exposition grounds in loops, so that there are no "dead ends." It is said to be the most complete system of its kind ever installed.

THOMAS A. EDISON has recently sent to the technical press and newspapers a letter calling attention to a campaign against concrete waged by various brick interests, taking the Edison fire as a text. He states that the publication deceives and is in error in many ways. His criticisms are as follows: The results of the fire at my plant on Dec. 9, 1914, are used in a misleading manner. Of the seven reinforced-concrete buildings, none were destroyed. A small section of the upper floor of one of the buildings fell in, but was supported by the lower floors. The pamphlet referred to presents three views of this, as if they were of three different buildings. The brick administration building to which it refers, and which remains standing, was protected by an adjacent concrete building and was not subjected to the fire. Every brick and steel building attacked by the fire was completely destroyed, together with all the machinery they contained, while the damage to the concrete buildings amounted to about 12%, and of the machinery in them 98% was saved and is now in operation. Manufacturing was resumed in some of the old concrete buildings a few weeks after the fire. Temperatures were far in excess of those in an ordinary fire, but reinforced concrete showed superiority over any other fire-resisting material.

THE Sussex Gas Company is making extensive improvements at the plant in West Seaford, Del. A new boiler, a condenser and a tar extractor have been installed. More than a hundred new consumers have been added to the company's service this summer.

A WINDOW display that is attracting great attention is made by the Laclede Gas Light Company in the new building at Eleventh and Olive streets, St. Louis, Mo. A swimming pool has been built in the corner windows, and an automatic gas water heater is connected with a shower bath arrangement in the pool. Interest is heightened by a small negro boy in a bathing suit who entertains the passing crowds by amusing antics. The company is making special terms on water heaters during June and July.

EMPLOYEES of the Detroit City (Mich.) Gas Company gave their third annual moonlight excursion on the steamer "Greyhound.'

A musical program was arranged for entertainment going to Sugar Island and on the return trip. Mr. Palmer was chairman; Mrs. Willis, secretary, and Mr. Fowler, treasurer of the arrangement committee.

THE 500-foot coke trestle at the Elgin plant of the Western United Gas and Electric Company is being torn down, the company having no further use for it, as all the coke is now made at the plant in Joliet. No more coke will be made in Elgin except during an emergency to supply the northern district with gas. Such an emergency existed a month ago and the gas was made for three weeks, while repairs were being made at Joliet. The plant is now shut down again and may never be used. While it was being operated all the coal on hand was used up and the coal shed emptied. This has been remodeled and will be used for coke storage.

THE club composed of employees of the Clinton (Mass.) Gas Light Company had its second meeting last week. William Dodge of Boston gave a talk on the uses for gas, paying particular attention to industrial gas, and demonstrated many points in his talk. Refreshments were served by the young ladies employed by the company. It is planned to have a similar meeting each month. The officers are: President, Patrick Hallanan; vice-president, Austin Ruane; secretary, Miss Catherine Broderick; treasurer, Miss Lillian V. Scott.

THE Pacific Power and Light Company have started on a 10,000 foot extension of gas mains in Vancouver, Wash., giving service to a section of the city that has not had gas service heretofore. The district is on Capitol Hill and upper Kauffman avenue, and mains will be laid north on Columbia to Thirty-ninth street, west on Thirty-ninth to Kauffman and down Kauffman avenue to Thirty-second. Lateral mains on all the cross streets will be laid, and 65 service connections installed at once and others are expected.

THE Grand Rapids (Mich.) Gas Light Company is installing gas supply for the kitchens of the new Pantlind Hotel.

INCREASE in the price of natural gas and the establishment of a monthly minimum of $1 is asked by the East Ohio Gas Company in making a request for a new franchise in Youngstown, O. June 8, 1913, the company's old franchise expired, and it has been operating since that time without a franchise. The company now wants a 10-year franchise, with a minimum price during the first five years of 38 cents per 1,000 cubic feet and 40 cents per 1,000 cubic feet for the next succeeding five-year period. The present rate is 33 cents per 1,000, with a 10% discount if paid within 10 days, making the net rate 30 cents. In requesting a new franchise the company retains the discount privilege of 3 cents per 1,000 cubic feet for payments within 10 days, which makes the net price asked for 35 cents per 1,000 cubic feet for the first five-year period, and 37 cents for the second period of five years.

THE Calhoun Gas Company, Battle Creek, Mich., will build an additional holder of 750,000 capacity, with 24" connections, on a plot on Monroe street purchased for that use.

IN criticising the Minneapolis, Minn., Lighting Department the statement is made that the gas inspector gets $3,000 salary a year and is allowed $600 additional for an automobile—$3,600 a year for about 300 days, or about $6 an hour for the two hours he puts in making two gas tests a day. In reply to his statement that each gas test required about one and one-half hours, statements of four chemists are given that a test can be made in from 10 to 30 minutes.

THE assessment of the Milwaukee (Wis.) Gas Light Company in the city and county districts to which its service extends has been increased $300,000 by the boards of assessors, the total assessment being fixed at $12,300,000. Sheldon J. Glass, vice-president of the company, made no determined protest against the raise, but expressed the opinion that the assessment of last year should stand. When the valuation had been decided upon Mr. Glass said there would be no further protest. Nearly 98% of the property of the company is in the city. The apportionment in the county is: Greenfield, $49,570; Lake, $23,620; Wauwatosa, $112,790; East Milwaukee, $25,830; West Milwaukee, $35,420; Milwaukee, $12,052,770.

UTILITIES COMMISSION NEWS.

NO INTEREST ON DELINQUENT ACCOUNTS.—The Arizona Commission has denied the application of the Tucson Gas, Electric Light and Power Company for authorization to charge interest on delinquent accounts, as it would result in a larger delinquent account, thereby increasing the volume of uncollectible accounts, and would reflect an increased cost and burden to consumers meeting their obligations promptly.

MINIMUM LAWFUL IN DISTRICT of COLUMBIA.—The Public Utilities Commission has decided that the practice of the Potomac Electric Power Company in making a minimum monthly charge where premises are connected with its lines does not appear to be in violation of the law. This decision followed a complaint made by the Northeast Washington Citizens' Association.

VIEWS OF THE MISSOURI COMMISSION.—In its annual report for the last year the Missouri Commission says:

"A proper consideration of the element of depreciation in fixed assets will preserve integrity of the capital invested as well as the operating accounts, provide for the eventual replacement of worn-out property, prevent the marketing of securities of run-down plants, and prevent the payment in dividends of that portion of the plant that has been consumed during the year.

"A number of the rate schedules are quite complicated, and this is particularly true of electric schedules. A number of revisions have been received which, if allowed to become effective, would have resulted in discrimination among the consumers technically of the same class in violation of the law. The probabilities of such discrimination are usually called to the attention of the utility, and, if pertinent, suggestions are made for revision or additions. The advice of this department in such matters is almost invariably accepted.

"The establishment of service rules will add considerably to routine duties and will involve an addition to the present working force and more or less elaborate laboratory and field equipment. Co-operation with the State University in these matters has been seriously considered, as the university laboratories are already well equipped for work of this nature and its faculty has expressed a willingness to co-operate with the commission. However, it would be advisable for the commission to be supplied with a suitable equipment of its own for ordinary referee and standardization testing.

"The commission has endeavored in every way possible to improve conditions among employees of public utilities, by letting it be known that adequate service contemplates reasonably and courteous treatment to the public. Employees can make for the company it's most valuable asset—the good will of the public. In some hearings citizens have been anxious to testify to the courteous and accommodating disposition and kind treatment by the superintendent or manager of utilities.

"The commission recommends provision in the law for the 'indeterminate permit,' similar to the one in Wisconsin; and the submission of a constitutional amendment providing that appeals from orders and decisions of the commission shall go direct to the Supreme Court."

APPOINTED TO WEST VIRGINIA COMMISSION.—Governor Hatfield has appointed as members of the commission, Messrs. William M. O. Dawson, of Charleston, Elliott Northcott, of Huntington, and E. F. Morgan, of Fairmont. Mr. Dawson is a former Governor of the State. Mr. Northcott, the chairman, was United States Minister to Venezuela under President Taft and has served as district attorney for the southern district of West Virginia. Mr. Morgan was formerly judge of the Marion County intermediate court.

BLOCK LIGHTING UNDER AUTHORITY OF COMMISSION.—The Public Service Commission, Second District, New York, has informed E. W. Edwards & Son, of Syracuse, that if the firm enters the business of block lighting in the city of Syracuse, it will come within the jurisdiction of the Commission. The Commission announce that it will entertain a petition for authority to conduct such business if the Edwards company contemplates furnishing electricity to the city of Syracuse.

Financial Notes.

THE trustees of the MASSACHUSETTS GAS COMPANIES have set aside from the earnings of the year just closing $1,250,000 for the payment of 5% on the common stock during the ensuing fiscal year.

Boston Consolidated Gas has declared a quarterly dividend of 2½%, making 8½% for the year, as compared with 8% last year. New England Gas and Coke pays 3½%, as compared with 4½% last year.

New England Coal and Coke pays 20%, as compared with 40% last year, and Boston Tow Boat pays 12%, as compared with 10%.

For the quarter, Citizens Gas of Quincy paid 1%, as compared with 1¼% last year, Newton and Watertown 2½, as compared with 2%, and East Boston paid 3½, the same as last year.

Federal Coal and Coke paid New England Coal and coke 15% as compared with 10% last year and J. B. Coal paid no dividend on its shares this year as compared with 5% last year.

The combined surplus for dividends of the system in May were $230,759 as compared with $218,502 in 1914, an increase of $12,257. This is the largest profit ever earned in May. The gas companies showed an increase of $21,453 and the coal companies a decrease of $9,197.

For the 11 months to May 31, the earnings were $2,422,218 as compared with $2,332,997, an increase of $90,000. Gas earnings show an increase of $175,000 and coal earnings a decrease of $85,000.

The following table shows the combined surplus for dividends of the subsidiary companies for May and 11 months since earnings have been reperted:

	May.	11 Months.
1907	$147,396	$1,169,771
1908	128,271	1,668,705
1909	151,180	1,739,642
1910	186,563	2,041,384
1911	188,838	2,181,759
1912	193,656	2,188,528
1913	212,164	2,598,434
1914	218,502	2,332,997
1915	230,759	2,422,218

THE COLUMBIA GAS AND ELECTRIC COMPANY, by its control of the United Fuel Gas Company becomes the largest natural gas interest in the world, the gas territority under its ownership and control now exceeding one million acres.

THE Michigan Railroad Commission has authorized the THORNAPPLE GAS AND ELECTRIC COMPANY of Hastings to increase its capital stock from $100,000 to $500,000.

THE deal was consummated last week whereby 71% of the common stock of the HARTFORD CITY GAS LIGHT COMPANY passed from the United Gas and Electric Light Corporation of New Jersey to Bodell & Co., of Providence, R. I., and Richter & Co., of Hartford, Conn., the two firms acting together in the purchase. The shares transferred amounted to 35,680, and the deal involved approximately $2,000,000. It is expected that the new owners will get representation on the Board of Directors.

THE CENTRAL HUDSON GAS AND ELECTRIC COMPANY has filed with the Clerk of the County of Duchess a certificate of consent of two-thirds of its stockholders to the issue of Convertible Debenture Coupon Bonds in an aggregate amount of $500,000, and application will be made to the Public Service Commission of the State of New York for the approval of this issue. The funds realized from the sale of these securities will be used for the necessary extensions and additions to the property and plant already completed, as well as for construction work now being installed and that required in the near future.

THE HOUSTON GAS AND FUEL COMPANY has declared the regular quarterly dividend of 1¾% on its preferred stock, payable July 1 to stock of record June 15.

THE $1,400,000 issue of PROVIDENCE GAS COMPANY three-year convertible debentures is all subscribed for, but the percentage of stockholders who sold their rights is a trifle larger than the 25% estimated. The debentures, "to be delivered," can be traded in, and payment in full of $50 debenture must be made on or before July 1. The company is now financed for three years at a low rate of interest. The rights were "high" at $8 in March (advance trades) and low at $5.50, at the time the markets were upset by the Lusitania massacre.

THE PACIFIC GAS AND ELECTRIC COMPANY reports:

April—	1915.	Increase.
Gross earnings	$1,512,103	$128,796
Net earnings	795,974	117,781
Surplus	439,410	151,186
From July 1—		
Gross earnings	$17,448,235	$1,212,112
Net earnings	8,751,307	1,421,012
Surplus	4,199,318	1,286,072

THE GRAND RAPIDS GAS LIGHT COMPANY distributed last week $4,700 to 230 employees, as its regular employees' dividend.

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